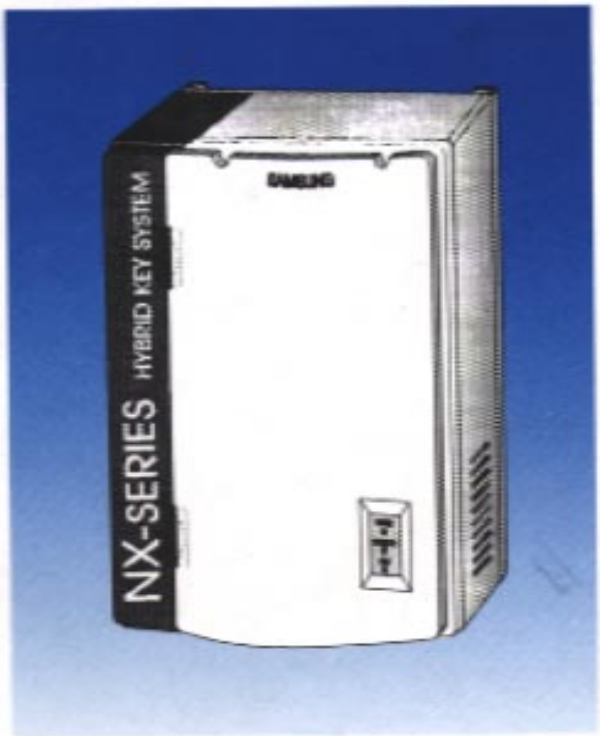
SAMSUNG

NX-SERIES

(NX-308, NX-820, NX-1232)

SERVICE Manual

DISPLAY NX-SERIES



CONTENTS

1. GENERAL DESCRIPTION

2. CIRCUIT DESCRIPTION

3. TROUBLE SHOOTING

4. PBA LAYOUT

5. PARTS LIST

6. EXPLODED VIEW
& PARTS LIST

7. CIRCUIT DIAGRAM

SAMSUNG
ELECTRONICS

Head Office :
9th FL., Joong-Ang Ilbo Bldg.
7 Soonwha-Dong, Chung-Ku, Seoul, Korea
C. P. O. Box 2775
Tel : (02) 751-6493, 6509
Fax : (02) 751-6072

Gumi Factory :
259, Gongdan-Dong, Gumi, Kyungbuk,
Korea
Tel : (0546) 460-2831
Fax : (0546) 460-2832

© Samsung Electronics Co., Ltd. August, 1996
Printed in Korea
GA68-60673A ED : 01 DN

1.GENERAL DESCRIPTION

1-1 SYSTEM OVERVIEW

1.1.1 NX-308 SYSTEM 1-1

1.1.2 NX-820 SYSTEM 1-1

1.1.3 NX-1232 SYSTEM 1-1

1-2 SYSTEM CONFIGURATION

1.2.1 NX-308 SYSTEM 1-2

1.2.2 NX-820 SYSTEM 1-2

1.2.3 NX-1232 SYSTEM 1-3

1-3 SPECIFICATIONS

1.3.1 ELECTRICAL SPECIFICATIONS 1-4

1.3.2 DIMENSIONS AND WEIGHTS 1-4

1.3.3 ENVIRONMENTAL LIMITATION 1-4

1.3.4 CABLE REQUIREMENTS 1-4

1.GENERAL DESCRIPTION

1.1 SYSTEM OVERVIEW

The **NX-series** hybrid key system has three kinds of Key Service Unit - **NX-308**, **NX-820** and **NX-1232**.

1.1.1 NX-308 SYSTEM

The **NX-308** system is an analog telephone system designed for small-sized business. The **NX-308** system has a maximum capacity of **three(3) telephone lines** and **eight(8) stations**. A powerful **HM64180R1** microprocessor digitally controls all speech paths and system functions. The operating program with default memory is stored in non-volatile ROM **27C020**. Customer data is stored in RAM **62256** and protected by Ni-Cd battery for up to seven day's continuous loss of system power. When AC power is restored, the Ni-Cd battery is recharged.

1.1.2 NX-820 SYSTEM

The **NX-820** system is an analog telephone system designed for small to medium-sized business. The **NX-820** system has a maximum capacity of **twenty eight(28) ports**, the sum of telephone lines and stations, of which combination is flexibly selected. Comprised of only a Key Service Unit, expansion boards, electronic keysets and conventional single line telephones, **NX-820** system offers small or medium-sized business user's flexibility and control of telephone communications. A powerful **HM64180R1** microprocessor digitally controls all speech paths and system functions. The operating program with default memory is stored in non-volatile ROM **27C020**. Customer data is stored in **RAM 681000** and protected by Ni-Cd battery for up to seven day's continuous loss of system power. When AC power is restored, the Ni-Cd battery is recharged.

1.1.3 NX-1232 SYSTEM

The **NX-1232** system is an analog telephone system designed for small to medium-sized business. The **NX-1232** system has a maximum capacity of **forty eight(48) ports**, the sum of telephone lines and stations, of which combination is flexibly selected. Comprised of only a Key Service Unit, expansion boards, electronic keysets and conventional single line telephones, **NX-1232** system offers small or medium-sized business user's flexibility and control of telephone communications. A powerful **HM64180R1** microprocessor digitally controls all speech paths and system functions. The operating program with default memory is stored in non-volatile ROM **27C020**. Customer data is stored in **RAM 681000** and protected by Ni-Cd battery for up to seven day's continuous loss of system power. When AC power is restored, the Ni-Cd battery is recharged.

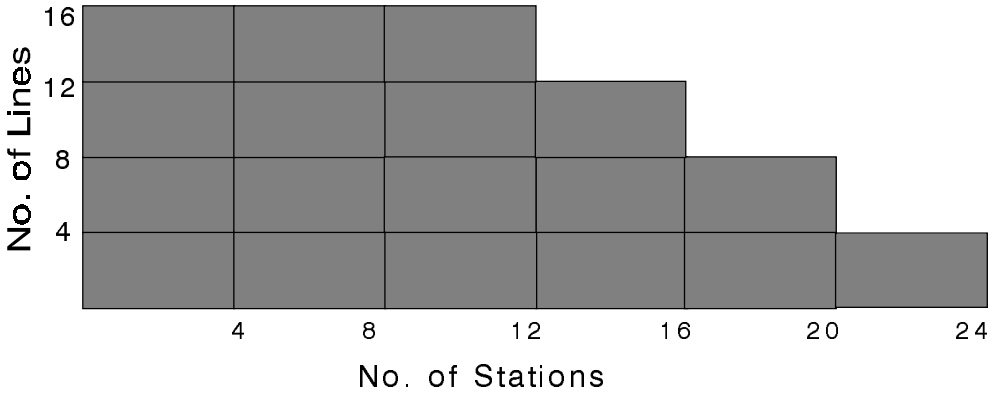
1.2 SYSTEM CONFIGURATION

1.2.1 NX-308 SYSTEM

The basic KSU (Key Service Unit) comes equipped to operate **three(3) telephone lines** and **eight (8) stations**. Station from #1 is assigned to be used with a keyset and stations from #2 to #8 are assigned for keysets or single line telephones which can be respectively selected. Optionally, the **NX-SMDR/R-MMC** and **NX-DPH/PAGING** can be installed.
The **NX-SMDR/R-MMC** card is the serial interface card for SMDR and REMOTE MMC and the **NX-DPH/PAGING** card is the doorphone and external paging interface card. These cards can be installed on the base board.

1.2.2 NX-820 SYSTEM

TThe basic KSU (Key Service Unit) comes equipped to operate **four (4) telephone lines** and **twelve (12) stations**. Station from #1 to #4 are assigned to be used with keysets and stations from #5 to #12 are assigned for single line telephones. The NX-820 system has several kinds of expansion cards. The **NX-2TRUNK**, the **NX-4TRUNK**, the **NX-4KLI**, the **NX-4SLI** and the **NX-4 OPX** card can be installed in any slot of the three expansion slots. By combining these cards, the **NX-820** system can be increased to its maximum capacity of **twenty eight (28) ports**.



Basic KSU

Basic KSU, one 4 SLT (or 4 KTS) Board and one 4 TRK Board

Basic KSU, one 4 SLT (or 4 KTS) Board and two 4 TRK Board

Basic KSU and three 4 TRK Board

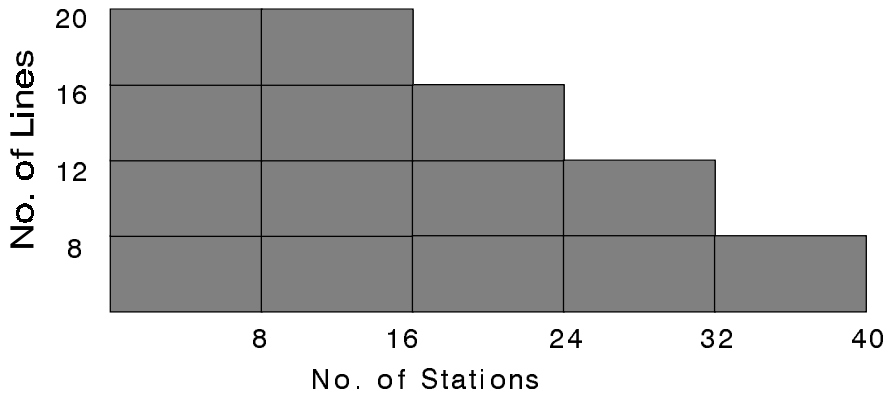
Basic KSU, two 4 SLT (or 4 KTS) Board and one 4 TRK Board

Basic KSU and three 4 SLT (or 4 KTS) Board

Optionally, the **NX-SMDR/R-MMC** and **NX-DPH/PAGING** card can be installed.
The **NX-SMDR/R-MMC** card is the serial interface card for SMDR and REMOTE MMC and the **NX-DPH/PAGING** card is the doorphone and external paging interface card. These cards can be installed on the base board.
The above chart describes configurations using expansion cards.

1.2.3 NX-1232 SYSTEM

The basic KSU (Key Service Unit) comes equipped to operate **eight (8) telephone lines** and **sixteen (16) stations**. Station from #1 to #8 are assigned to be used with single line telephones or keysets which is respectively selected, and stations from #9 to #16 are assigned for single line telephones. The **NX-1232** system has several kinds of expansion cards. The **NX-2TRUNK**, the **NX-4TRUNK**, the **NX-4KLI**, the **NX-4SLI**, the **NX-4OPX**, the **NX-8KLI**, and the **NX-8 SLI** card can be installed in any slot of the three expansion slots. By combining these cards, the **NX1232** system can be increased to its maximum capacity of **forty eight (48) ports**.
Optionally, the **NX-SMDR/R-MMC** and **NX-DPH/PAGING** card can be installed.
The **NX-SMDR/R-MMC** card is the serial interface card for SMDR and REMOTE MMC and the **NX-DPH/PAGING** card is the doorphone and external paging interface card. These cards can be installed on the base board.The below chart describes configurations using expansion cards.



Basic KSU

Basic KSU, one 8 SLT (or 8 KTS) Board and one 4 TRK Board

Basic KSU, one 8 SLT (or 8 KTS) Board and two 4 TRK Board

Basic KSU and three 4 TRK Board

Basic KSU, two 8 SLT (or 8 KTS) Board and one 4 TRK Board

Basic KSU and three 8 SLT (or 8 KTS) Board

1.3 SPECIFICATIONS

1.3.1 ELECTRICAL SPECIFICATIONS

AC INPUT	110/220 V_{AC}, 50/60 Hz	
POWER CONSUMPTION	NX-308	50 WATTS MAX
	NX-820	55 WATTS MAX
	NX-1232	80 WATTS MAX
MAX CURRENT DRAW AT 220 V_{AC}	NX-308	0.22 AMP
	NX-820	0.29 AMP
	NX-1232	0.36 AMP
RING GENERATOR	AC 80 Vrms, 25 Hz	
BATTERY BACKUP SUPPLY	24 V_{DC} Batteries rating not less than 6 hours but not more than 26 hours	

1.3.2 DIMENSIONS AND WEIGHTS

KEY SERVICE UNIT	NX-308	530 mm(H) × 348 mm(W) × 102 mm(D), 4.9 Kg
	NX-820	530 mm(H) × 412 mm(W) × 140 mm(D), 8.9 Kg
	NX-1232	530 mm(H) × 412 mm(W) × 140 mm(D), 8.9 Kg
KEYSET		214 mm(H) × 206 mm(W) × 150 mm(D), 1.1 Kg
AOM		214 mm(H) × 133 mm(W) × 150 mm(D), 0.4 Kg
DOOR PHONE		158 mm(H) × 89 mm(W) × 41 mm(D), 0.23 Kg

1.3.3 ENVIRONMENTAL LIMITATIONS

OPERATING TEMPERATURES	0 ℃ - 45 ℃ (18 ℃ - 25 ℃ recommended)
OPERATING HUMIDITY	10 % - 90 % (without condensation)

1.3.4 CABLE REQUIREMENTS

ELECTRONIC SET	2 pair twisted, Max. 400 m (24 AWG)
SINGLE LINE TELEPHONE	1 pair twisted, Max. 1 km (24 AWG)
DOOR PHONE	1 pair twisted, Max. 100 m (24 AWG)

2.CIRCUIT DESCRIPTION

2.1 TRUNK INTERFACE CIRCUIT 2-1
2.1.1 Surge Protection 2-2
2.1.2 Ring Signal/DC Loop Detection 2-2
2.1.3 DC Loop/DC BYPASS 2-2
2.1.4 AC Impedance Matching 2-2
2.1.5 MP/PRS Detection 2-3
2.1.5.1 Metering Pulse Detection Circuit.....2-3
2.1.5.2 Polarity Reverse Signal Detection Circuit..... 2-3
2.2 SINGLE LINE TELEPHONE INTERFACE CIRCUIT 2-3
2.2.1 DC Power Feeding Part 2-3
2.2.2 Ring Signal Feeding Part 2-3
2.2.3 Loop/Pulse Detection Circuit 2-4
2.2.4 Speech Transmission Circuit 2-4
2.2.5 Over-voltage Protection Part 2-4
2.3 KEYSET INTERFACE CIRCUIT 2-5
2.4 NETWORK CIRCUIT 2-7
2.4.1 NX-308 SYSTEM .....2 - 8
2.4.2 NX-820 SYSTEM .....2 - 9
2.4.3 NX-1232 SYSTEM .....2 -10
2.5 TONE GENERATOR CIRCUIT .....2 -11
2.6 DTMF SENDER (MFS) CIRCUIT .....2 -12
2.7 DTMF RECEIVER CIRCUIT .....2 -13
2.8 MUSIC SOURCE CIRCUIT .....2 -14
2.9 DOOR-PHONE INTERFACE CIRCUIT .....2 -15
2.10 EXTERNAL PAGE INTERFACE CIRCUIT .....2 -16
2.11 CPU AND CONTROL LOGIC .....2 -17
2.11.1 CPU (Central Process Unit) .....2 -17
2.11.2 Reset Circuit .....2 -17
2.11.2.1 Voltage Level Detector .....2 -18
2.11.2.2 Watch-dog Circuit .....2 -18
2.12 RTC (Real Time Clock) ..... 2 -19
2.13 MEMORY BACK-UP CIRCUIT .....2 -19
2.14 CPD (CALL PROCESS DECODER) .....2 -20
2.15 VOICE ANNOUNCEMENT SERVICE CIRCUIT .....2 -20
2.16 AC/DC CONVERTER .....2 -21
2.17 YSTEM BACK-UP INTERFACE .....2 -22
2.17.1 Battery Charge Circuit .....2 -22
2.17.2 Battery Discharge Circuit .....2 -23
2.18 RING SIGNAL GENERATOR .....2 -24
2.19 POWER REGULATOR .....2 -25

2. CIRCUIT DESCRIPTION

2.1 TRUNK INTERFACE CIRCUIT

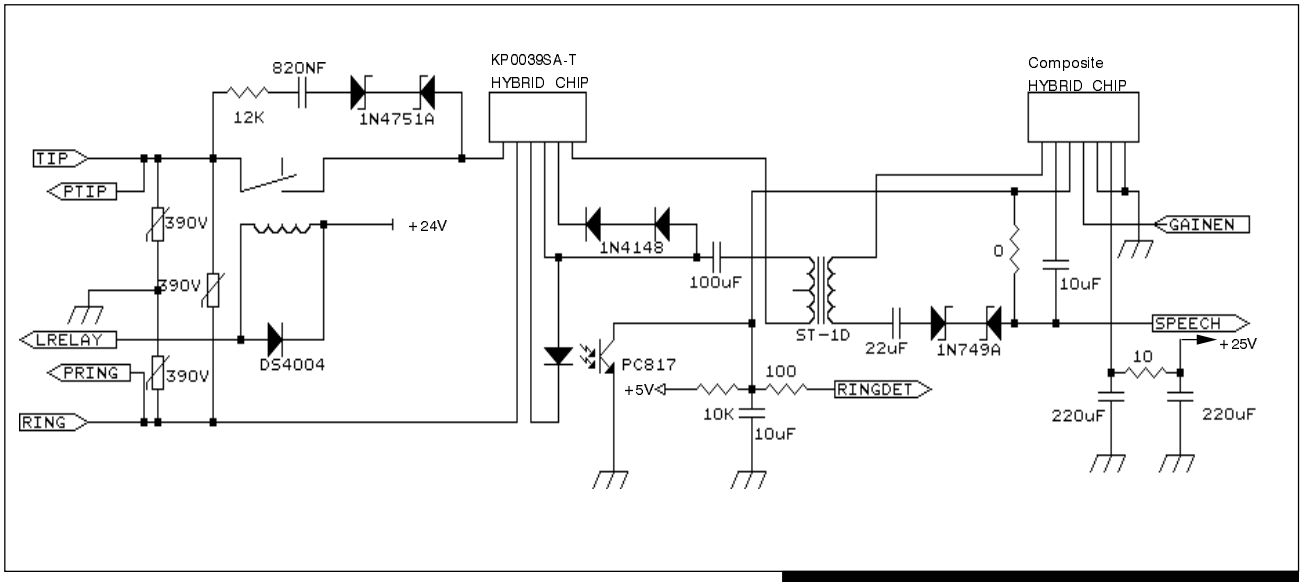
Loop trunks have two outside line connections that are called as Ring and Tip terminals. Ring terminal receives the ring signal and it is a reference line for signaling and speech. And the Tip terminal receives the hot signals. Generally, the terminals of Loop start trunk have no polarity.
Anyway, loop control is the main signaling at loop-start trunk. In idle state, the loop is disconnected and the loop becomes accomplished for starting of signaling.

After the loop is made, Dial Pulses or DTMF signals are transmitted for addressing.
The exchange equipment accommodating the line may detect the address signals and operate to connect the originate to the opposite according to the addressing signals.
It describes the outgoing procedure of the loop start trunk.

Its incoming procedure is as follows;
The Ring signal is generated by exchange and can be detected at this interface. The system detects the ring signal and gives that to the assigned station.

The features of the Trunk Interface Circuit are as follows;

- Surge Protection
- Ring Signal/DC Loop Detection
- DC Loop/DC BYPASS
- AC Impedance Matching
- Metering Pulse / PRS Detection



TRUNK CIRCUIT DIAGRAM

2.1.1 Surge Protection

This feature is applied to common mode and normal mode. Both of these two modes are protected from over-voltage over 390 V.
To protect the system from surge or over-voltage, three 390 V varistors are used.
To protect from longitudinal high voltage, two varistors are used between Tip and earth and between Ring and earth. These two varistors clip high voltage.
Protecting from metallic surge, one 390 V varistor is used between Tip and Ring.
Frequently lightening site has to include additional surge suppresser to the line in parallel, and must have system ground.

2.1.2 Ring Signal/DC Loop Detection

When the Ring Signal incomes from the trunk line, the Ring Signal transmitted through the path of 3K R - MM824 C - 1N4751A - KP0039SA - PC817. This R, C, and Zener diodes decide the ring impedance.
When the Ring Signal incomes, pin 4 of PC817 goes High to Low. The CPU detects the Low status and knows the Ring is in the trunk line.
Additionally, when the DC loop is completed by trunk Loop Relay, pin 4 of PC817 go High to Low, too. The CPU activates the Loop Relay to check in 4 of PC 817 and can detect the connection status of trunk line.
So, the role of PC817 opto coupler is detecting incoming ring and DC Loop.

2.1.3 DC Loop/DC BYPASS

In idle status, the Loop Relay moves to Tip line to make up DC Loop. DC Loop means the DC resistance.
DC current can flow through the DC Loop when DC voltage is given to the circuit.
DC Loop completion means that -48V power is connected to the DC resistance by using the relay. This DC resistance may have very large AC impedance.
This feature is called DC BYPASS and accomplished by the Hybrid Chip (KP0039SA-T).
DC resistance provided by KP0039SA-T is determined by the current from trunk line, and generally in the range of 50 ohm to 400 ohm.

2.1.4 AC Impedance Matching

AC impedance is determined by the characteristics of the transformer. The transformer, ST-1D, is an audio transformer that isolates the system from the trunk interface and its turn ratio is designed to 1 : 1.5 (600 ohm : 1350 ohm), which reduces the loss on the network.
The audio signal may be transferred from or to network through the clipping circuit that is composed of two Zener diodes of which Zener voltage is respectively 4.3V.
The Zener diode (1N0047SA) protects the network from any over-voltage, of which signal range is recommended from -5V to plus 5V.
Composite Hybrid Chip is the compensate circuit to reduce the insertion loss of the trunk and station (up to 1dBm).
If this Hybrid Chip is not used, o ohm resistance is used.

2.1.5 Metering Pulse (MP)/Polarity Reverse Signal (PRS) Detection

This feature is used to determine the cost of the call and provided by optional D-B'd equipped with the trunk circuit.

2.1.5.1 Metering Pulse Detection Circuit

Metering Pulse is the periodic high frequency pulses (12 kHz or 16 kHz) are returned from the central office to the system to determine the cost of the call.
To detect these pulses, the Low Pass Filter inside the Hybrid Chip is used. The Low Pass Filter detects 12 kHz or 16 kHz pulses; the CPU gets these pulses and counts the number of pulses and determines the cost of the call.

2.1.5.2 Polarity Reverse Signal Detection Circuit

PRS is the signal from the central office that turns the polarity of Tip and Ring in the reverse direction.
To detect this signal, opto coupler is used. The opto coupler detects the direction of the current; The CPU detects that and determines the cost of the call.

2.2 SINGLE LINE TELEPHONE INTERFACE CIRCUIT

Most of the current single line telephones operate with loop-start protocol and they may be equipped with the dialers to generate dial pulses or DTMF signals.
This interface is designed to serve two kinds of addressing signals; dial pulses and DTMF signals.

The features of the SLT interface circuit are as follows;

- DC Power Feeding Part
- Ring Signal Feeding Part
- Loop/Pulse Detection Circuit
- Speech Transmission Circuit
- Over-voltage Protection Part

2.2.1 DC Power Feeding Part

The Hybrid Chip (SLC-03) includes power feeding part with speech signal transmission and loop /pulse detection circuit.
The regulated DC from the connection B'd is fed through the hybrid device. The DC value is about 25 volts, and varying according to the power input voltage and load.
While SLT is in On-Hook status, the circuit is open. That means there is no path to flow the current. In other case, while Off-Hook status, Tip and Ring make DC loop that measured as about 50 ohm ~ 300 ohm DC resistance.
After DC Loop is completely made up, voltage level between Tip and Ring is dropped.
Transistor A709 and C1209 turn on under cut-off status, too.

2.2.2 Ring Signal Feeding Part

The Ring Signal generated on the Power B'd may be fed through the ring relay in the ring control part. The CPU adjusts the cadence of ring signals.

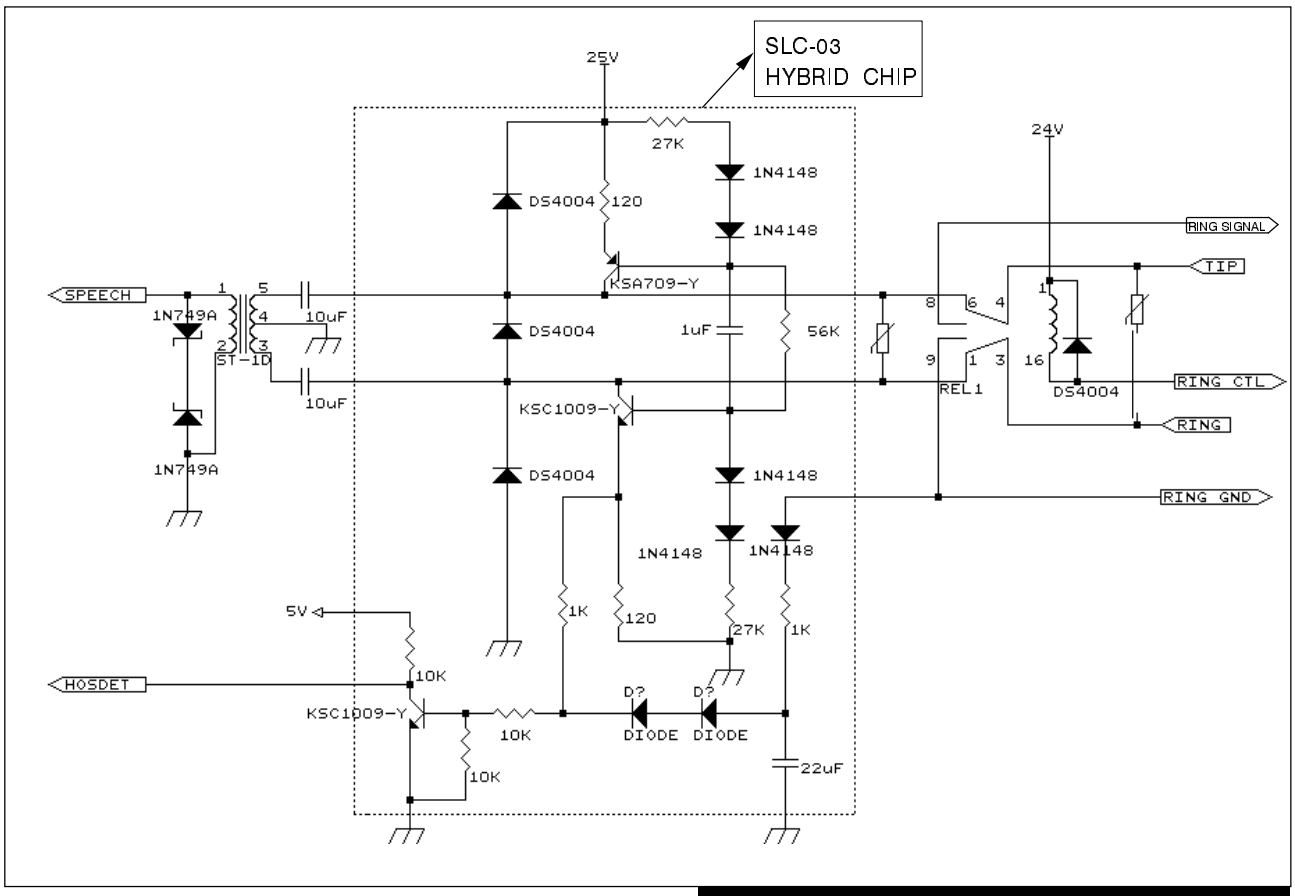
The ring signal path includes the serial resistors for short protection.

2.2.3 Loop/Pulse Detection Circuit

The Loop/Pulse Detection Circuit in the Hybrid device will perceive the loop condition.
For detecting the loop during ringing, ring trip circuit is simply attached.
The result to detect loop/pulse is respectively connected to the read buffer (74HC244) and the CPU gets the data.

2.2.4 Speech Transmission Circuit

Transformer ST-1D is prepared for power isolation of the speech path that is the same with the transformer in trunk interface circuit for impedance matching and reduction of the network loss. Two zener diodes (1N749A) are attached to protect the network chips from any over-voltage.



SLT INTERFACE CIRCUIT DIAGRAM

2.2.5 Over-voltage Protection Part

Either the communication path is made up or not, over-voltage on the Tip and Ring may damage the system. The over-voltage is made by the line or lighting strikes and either direct or indirect. To protect the damage, the 270 V and 33V varistors are connected between Tip and Ring in parallel.

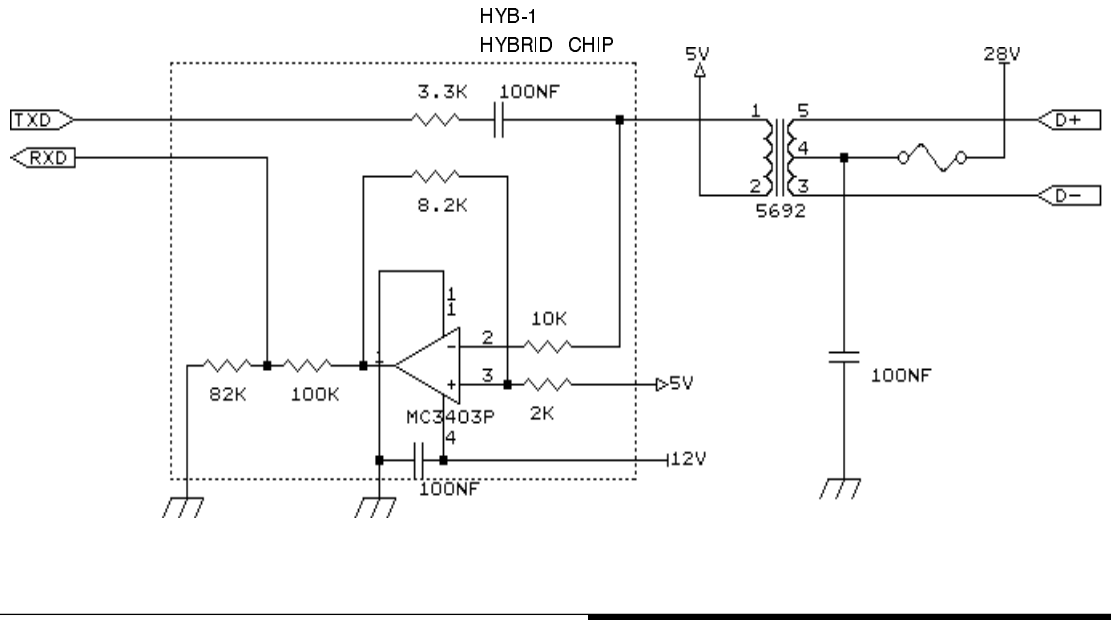
2.3 KEYSET INTERFACE CIRCUIT

The keyset is the proprietary equipment of the system and it may not operate with the other systems.
Keyset interface is for connecting the keyset to the system.

The interface consists of two paths; ***data path*** and ***speech path***.
The data path enables the data communications between the system and the keyset and the speech path is for the speech signal transmission.

Since each path is accomplished with two wires, to install one keyset requires four wires.
With regard to a keyset, the data communications are asynchronous and serial. Each bit duration is 3 msec.

The sending data (TxD) to keyset are as follows;



KTS INTERFACE CIRCUIT DIAGRAM

1	start bit	High state
3	Network ID	MSB first, keyset network control data
8	First Data byte	MSB first
	Second Data byte	MSB first
2	Waiting bits	Low state

The data to keyset are inverted at the demodulation circuit in keyset and the sending data consists of 22 bits including waiting bits as above.
After sending the data, the system receives the data (RxD) from keyset.

The receiving data (RxD) from keyset are as follows;

1	start bit	Low state

1	Parity bit	Even Parity Check
7	Data bits	MSB first
2	Waiting bits	High state

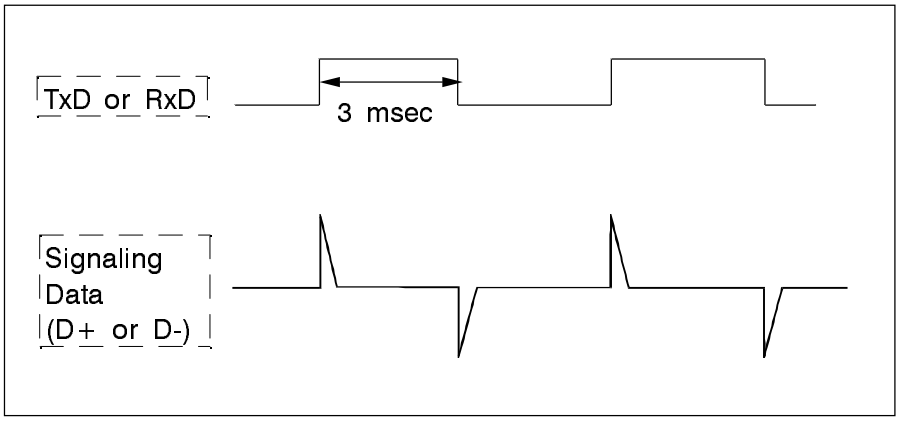
The system receives 11 bits from keyset and parity bit is for checking any fault in data communications.
As above, one data monitor is accomplished.
Immediately after receiving the data from keyset, the system sends its data again.
Sending and Receiving data are totally composed of 33 bits and it requires 99 msec.

The keyset data-communication consists of;

- Modulation circuit
- Demodulation circuit
- Power isolators

The **modulation/demodulation circuits** come to the hybrid device (HYB) or discrete parts. The modulation is accomplished with differentiating the pulse data. The transition from low to high is converted to high peak and the transition from high to low is converted to low peak of which time constant is determined by resistor and the capacitor.

The modulated signal is transmitted through the transformer, 5692 that is applied for power isolation.



The data from keyset is also the differentiated form and received through the same transformer. The modulated signal is converted to the pulse with the demodulation circuit. The signal level is detected and high/low thresholds determine the output to High/Low data. The noise margin is 0.8 volts that is determined by high/low threshold levels.

The speech path is simply composed of the isolation transformer (ST-1D) and the network protection devices.

Two zener diodes (1N749A) block and cut down any over-voltage that is over 4.3 volt to protect the network devices.

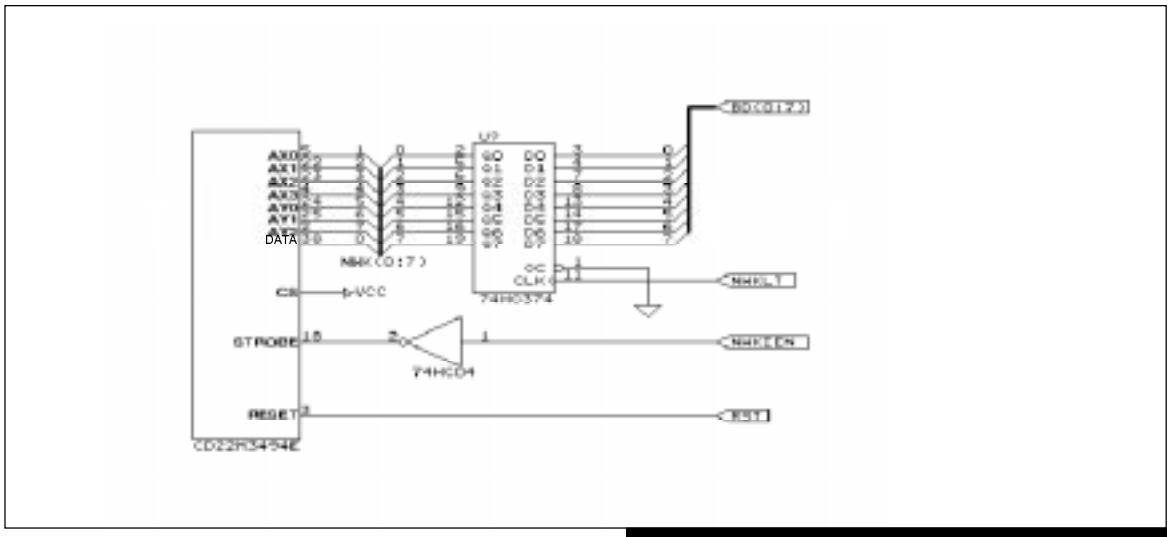
The keyset power is supplied by the system via the data and speech path wires. The system ground is fed through the center-tapped terminal of the speech transformer and the high power about 30 volts is fed through the center-tapped terminal of the data transformer.

On the high power feeding line, a thermistor (poly switch) is prepared for short-protection.

2.4 NETWORK CIRCUIT

The system is equipped with network for switching all kinds of calls. The network is composed of cross-point chip (M3494).

The system used Space Division Exchange that is usually called as an analog system.

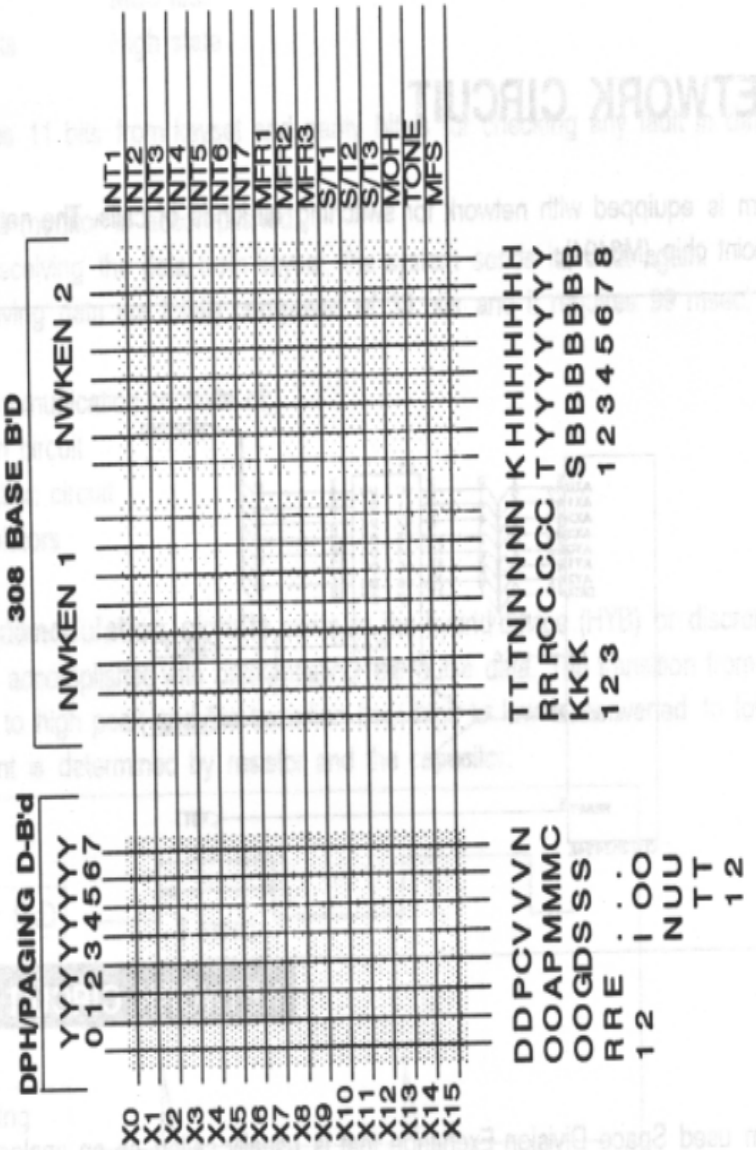


NETWORK CIRCUIT DIAGRAM

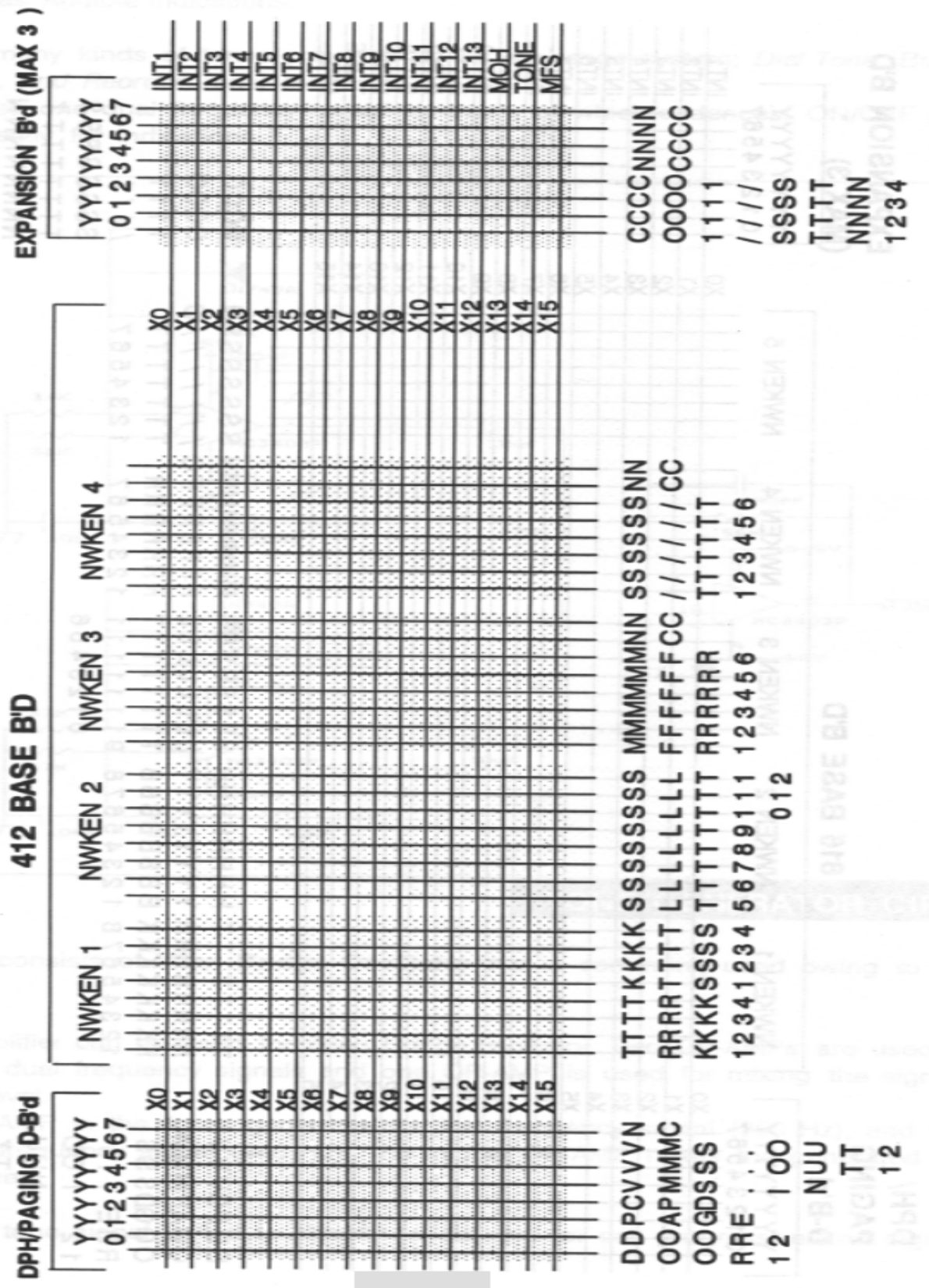
The M3494 contains a 16 by 8 array of cross-point. e by selecting the appropriate 7 input bits (AX0~AX3, AY0~AY2).
The selected switch can be turned ON or OFF by applying a logical one or zero to the data in and the strobe input is set to logical one. A reset signal can be used to turn off all the switches together when it is set to logical one.

Each system has different cross-point configuration. From next page, Each system's cross-point is described.

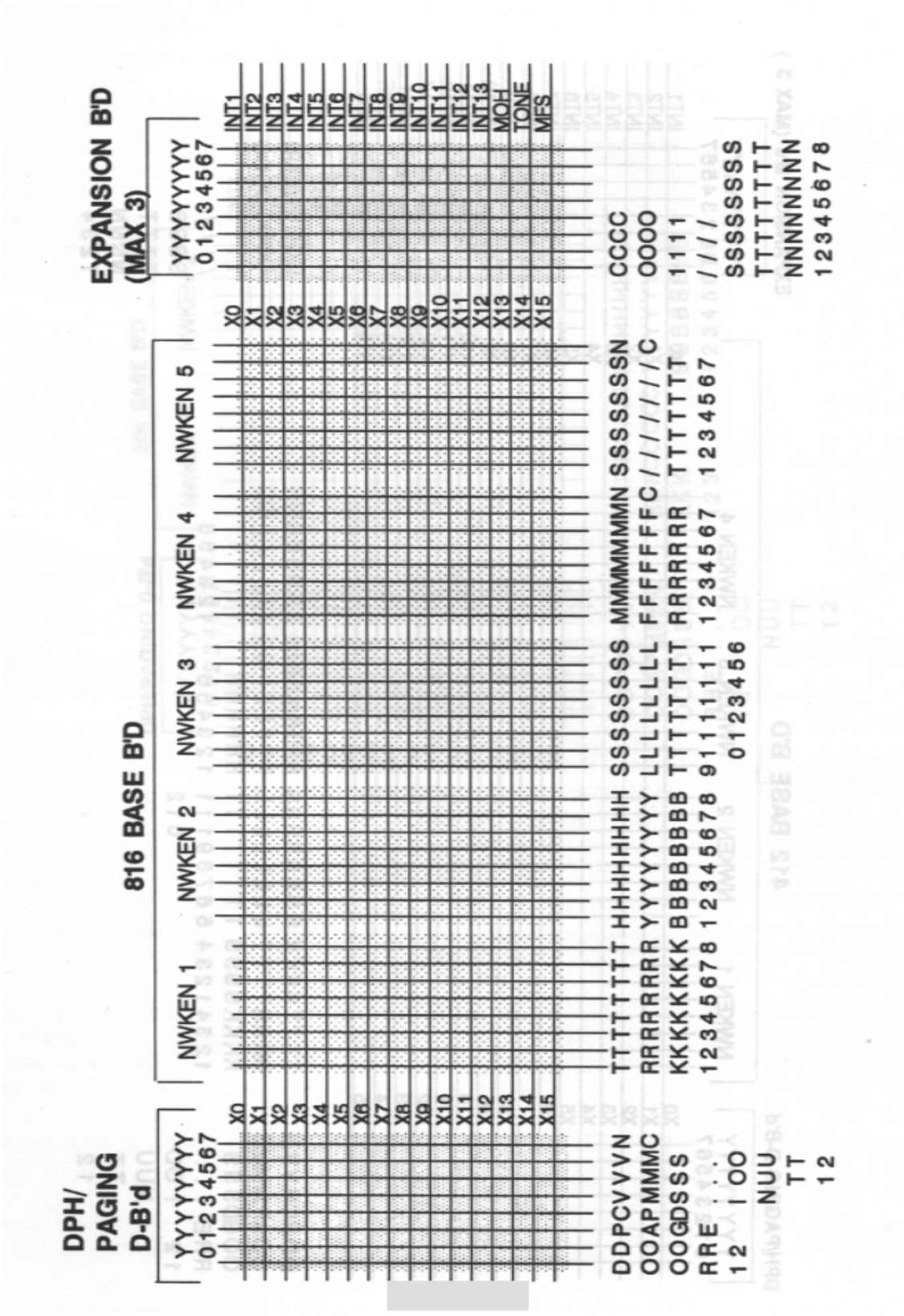
2.4.1 NX-308 SYSTEM



2.4.2 NX-820 SYSTEM



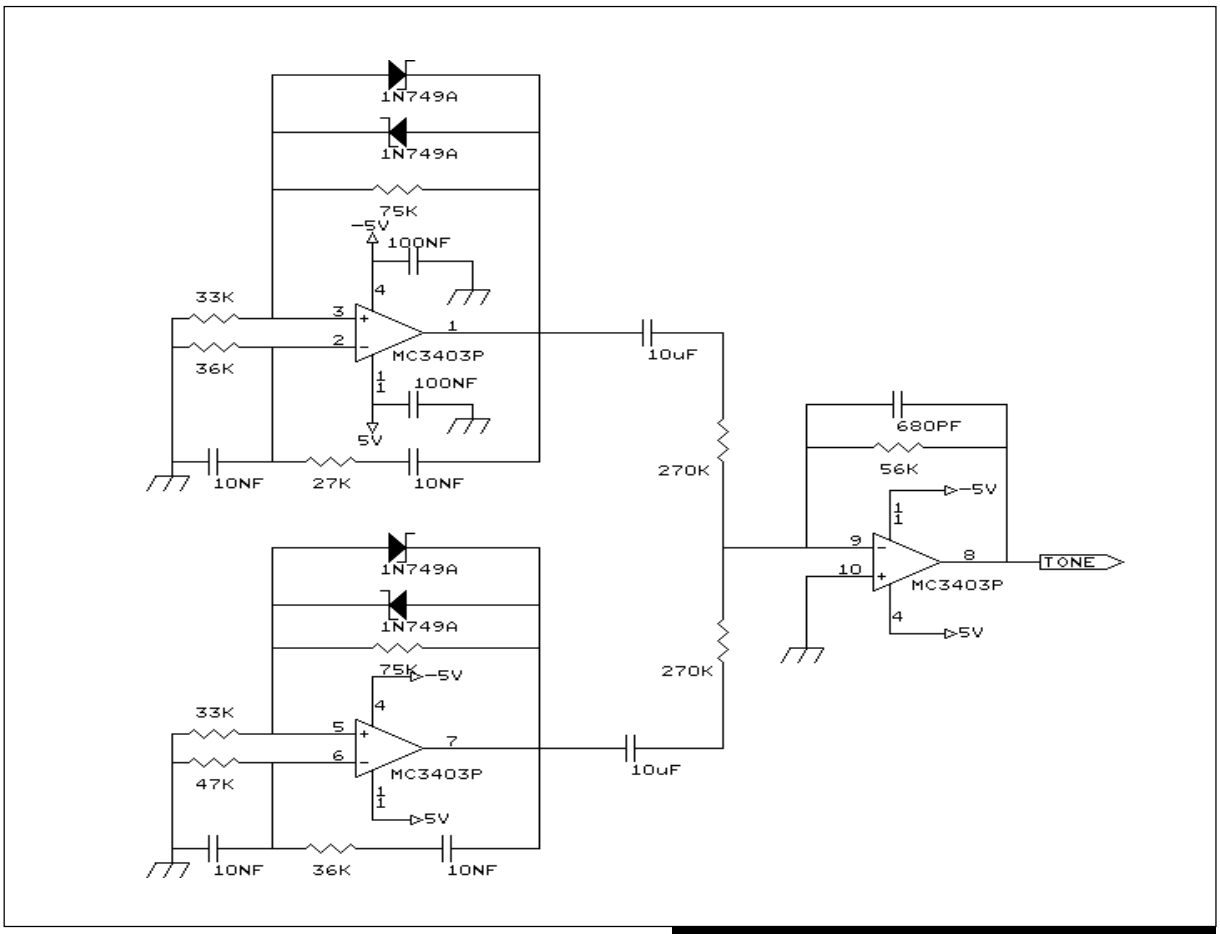
2.4.3 NX-1232 SYSTEM



2.5 TONE GENERATOR CIRCUIT

Tone Generator provides user the dual frequency signal for indicating call progressing. That is usually called as Audible Indications.

There are so many kinds of tones provided by an exchange system; *Dial Tone, Busy Tone, Ringback Tone, and Reorder Tone, etc.*
System provides one dual frequency signal for them, of which cadences; ON/OFF periods; are adjusted differently for indications.



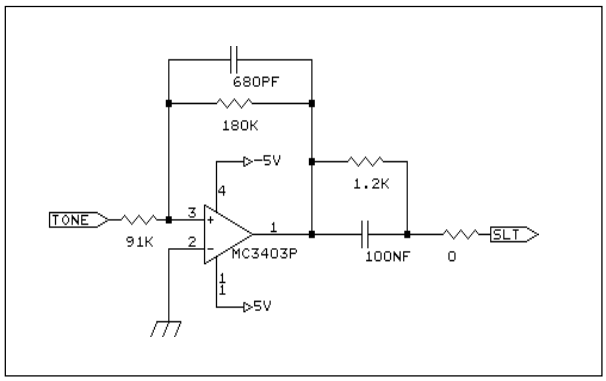
TONE GENERATOR CIRCUIT

The generator consists of **Wien Bridge Oscillator** that is commonly used owing to its reliability and simplicity.

Any signal amplifier can be used for Wien Bridge oscillator. Two OP-AMPs are used for generating the dual frequency signals and one OP-AMP is used for mixing the signals and adjusting the level.
The upper OP-AMP in the figure generates the low frequency signal (350 Hz), and the lower does the high frequency signal (440 Hz). The middle OP-AMP mixes the generated dual signals and makes tone.

The generated tone signal is fed to directly to network for call progressive tone signals. The

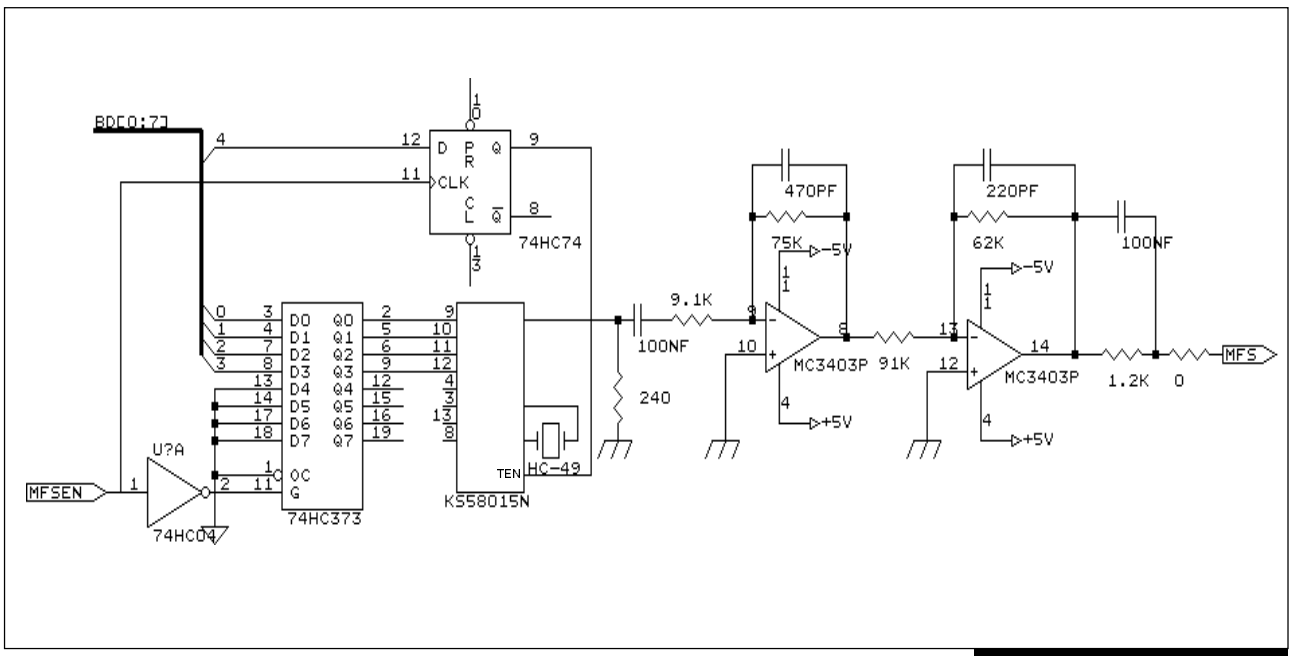
output impedance of OP-AMP is all-most GND and the tone source can be driven some ports at the same time.



Dial Tone Source for Single line Telephone should have the terminating impedance. Otherwise, the co-operated DTMF receiver can not detect dialing owing to the sink of the DTMF signals from SLT.
For the terminating impedance, the small signal amplifiers are interfaced and Network is required.
The system uses 1.2K Ohm resistor for termination and it results in signal amplification, because the level of tone signal decrease without amplification.

2.6 DTMF SENDER (MFS) CIRCUIT

The system is equipped with one DTMF sender that sends DTMF signals to the outside lines. Generally, DTMF sender provides 16 DTMF signals but only 12 DTMF signals are used commercially.



MFS CIRCUIT

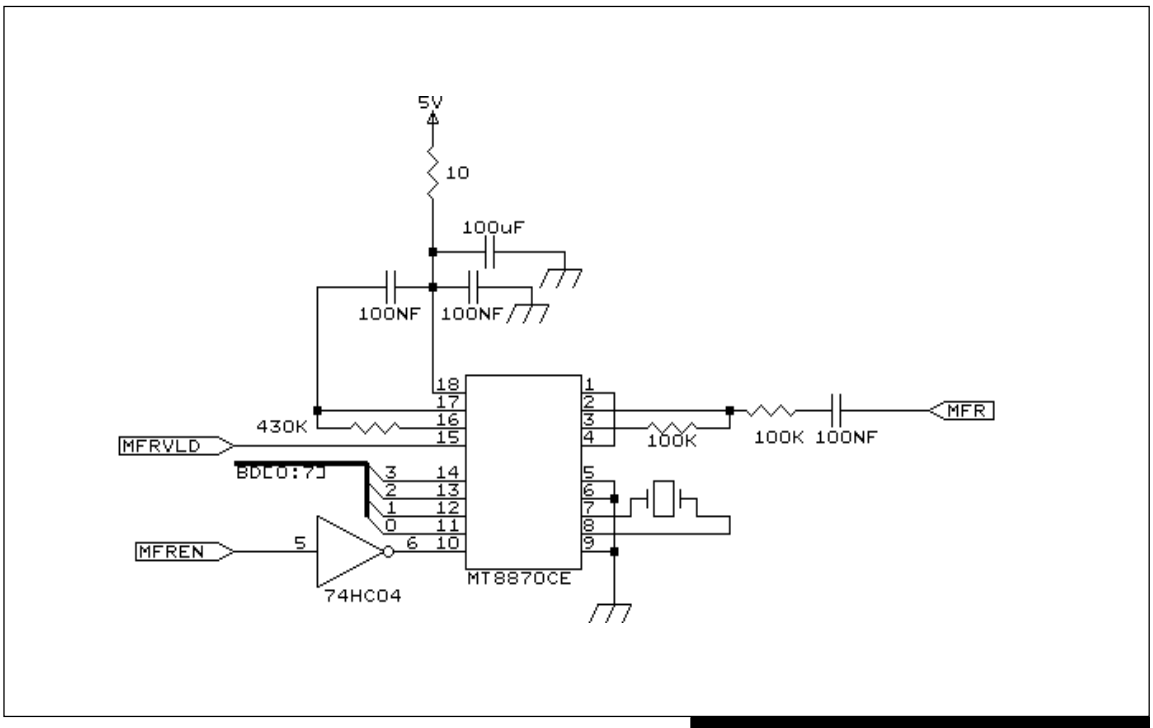
KS58015 (TP5088) is prepared for sending DTMF signals.
This device has five control terminals. One is for tone enable (TEN) and the others for DTMF signal selections to be generated. Those signal selections and tone enable can be approached through a latch.

The generated DTMF signal is amplified with the first and second amplifier to adjust the high and low frequency group level. The low cutoff frequency may be recommended about 300Hz and the high cutoff frequency may be 3400Hz.

1.2 K ohm is a source impedance of DTMF generator, which is specified at the regulations of tele-communication equipment. The resistance can be determined by measuring the AC impedance during DTMF sending.

2.7 DTMF RECEIVER CIRCUIT

The system is equipped with **DTMF receivers** for *detecting DTMF signal from SLT.*



MFR CIRCUIT DIAGRAM

MT8870 (or KT3170) is used for *receiving and decoding DTMF signals.*
This chip is a complete DTMF receiver integrating both of the band split filter and digital decoder functions. The valid input signal range of this chip is -29~+1.0 dBm.

When the system detects hook-off in SLT interfaces, DTMF receiver may be connected to Network with dial tone.

After receiving first digit, dial tone is disconnected and DTMF receiver continues to detect the digits from SLT or the specific lines. Those lines are to receive the addressing digits or prevent

the subscribers from dialing a toll.

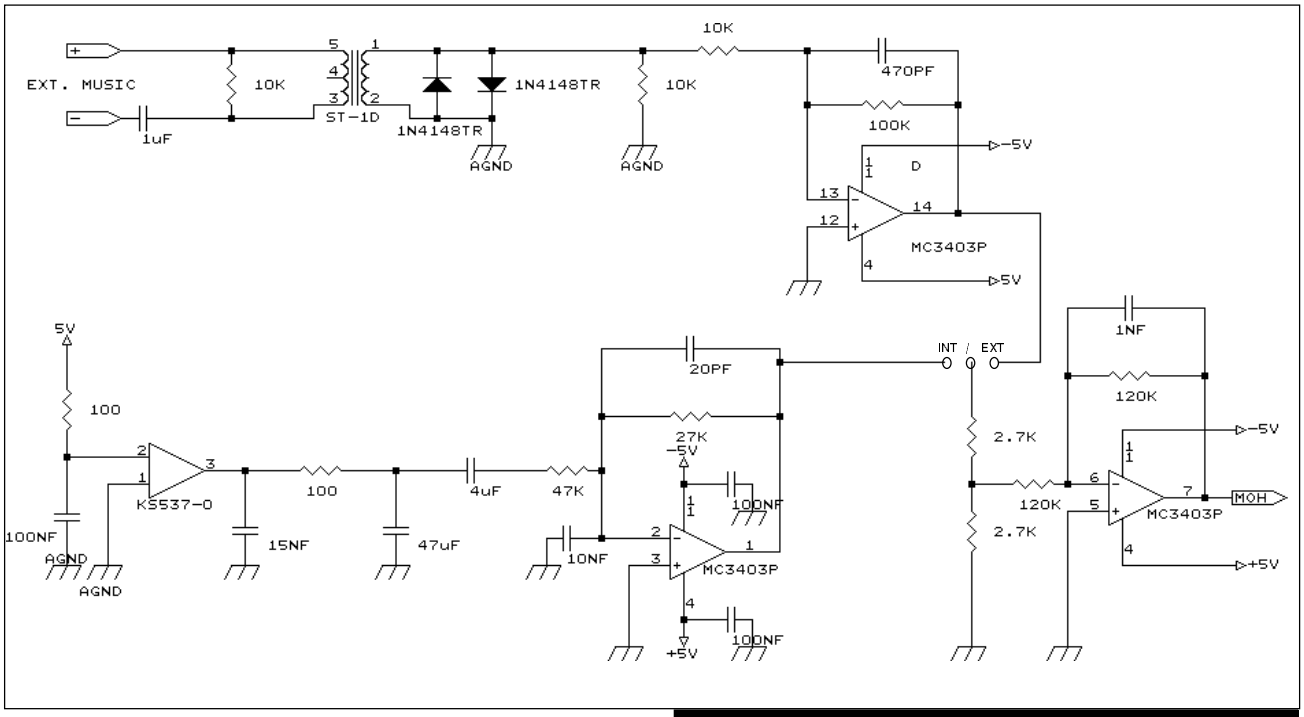
For Dial Pulse lines and telephones, the device will not operate.
CPU monitors periodically DTMF receivers whether they have detected any valid DTMF signal. MFRVLD signal is used to detect the valid signal that input is connected to STD pin of the receiver chip.

STD pin of the receiver may rise to HIGH when the chip receives a valid DTMF signal. After detecting STD, CPU can read the DTMF data registered in the chip by D0~D3 and MFREN signal.

2.8 MUSIC SOURCE CIRCUIT

The system is equipped with two kinds of music sources; *internal* and *external.* These two music sources are selected by shunt pin and connected to network.

The music source has two names; MOH (Music On Hold) and BGM (BackGround Music) according to its usage. MOH is the music provided on hold and BGM is the music heard at the keyset. But it is provided from the same source, the internal or the external music source.



MUSIC SOURCE CIRCUIT DIAGRAM

The internal music source is basically equipped in the system and is composed of the melody generator (KS537), and OP-AP.

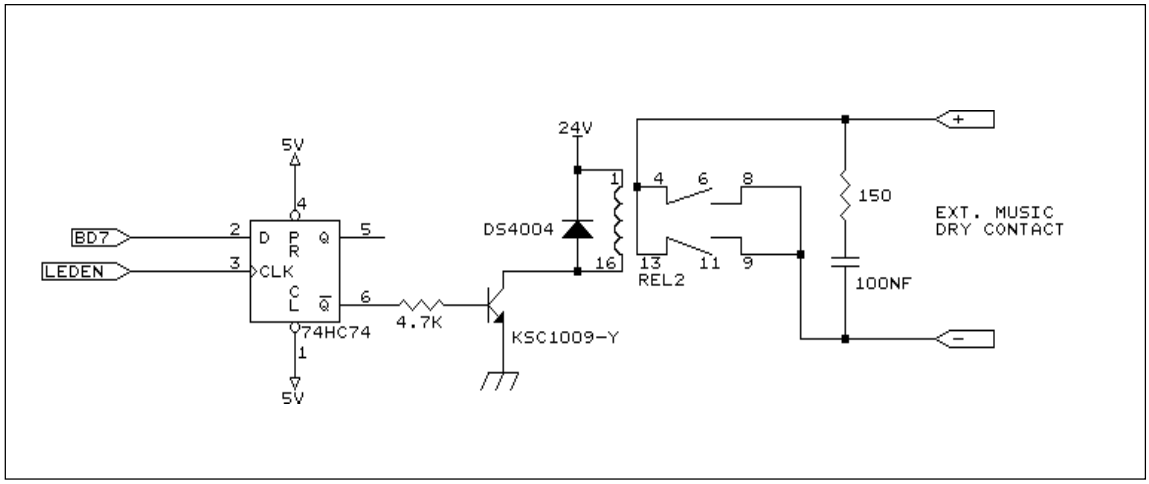
The Resistors (R209, R210) is connected to the output of INT/EXT MOH. For BGM, you should adjust the level at the keysets.

Following the resistors, a voltage follower is prepared for the low impedance source, which enables to apply the source to some of trunks or stations at the same time.

You can install the external music source for MOH or BGM, tape recorder or radio.
The External Music Source is connected to system with Audio Jack and interfaced with the isolation transformer and OP-AMP.

The transformer, ST-1D isolates the power between the external music source and the system. The transformer's turn ratio for impedance matching is 1:1.5.

Two Zener Diodes protect the network from over-voltage that may damage the network chips. The transferred signals via transformer are fed to OP-AMP input and the output of OP-AMP is connected to selected shunt pin.



One relay contact (REL2) is provided through the connects on the Base B'd. This contact is controlled by software. This relay is used as External Music Source power ON/OFF control.

2.9 DOOR-PHONE INTERFACE CIRCUIT

The system is equipped with two door-phone interfaces with lock release controls on the DPH/ PAGING D-B'd.

You cannot install any commercial door-phone to the system and only the 2-wire door-phone provided by SAMSUNG Electronics may be available.

Door-phone can be installed near the door or room for monitoring.
Two wires required to connect one door-phone and additional two wires may be required to control the door-lock if necessary.
All connections are accomplished through Modular Jack.

Two wires are for speech path and for the power to activate the door-phone. The speech path and power feeding circuit are very similar to SLT interface.

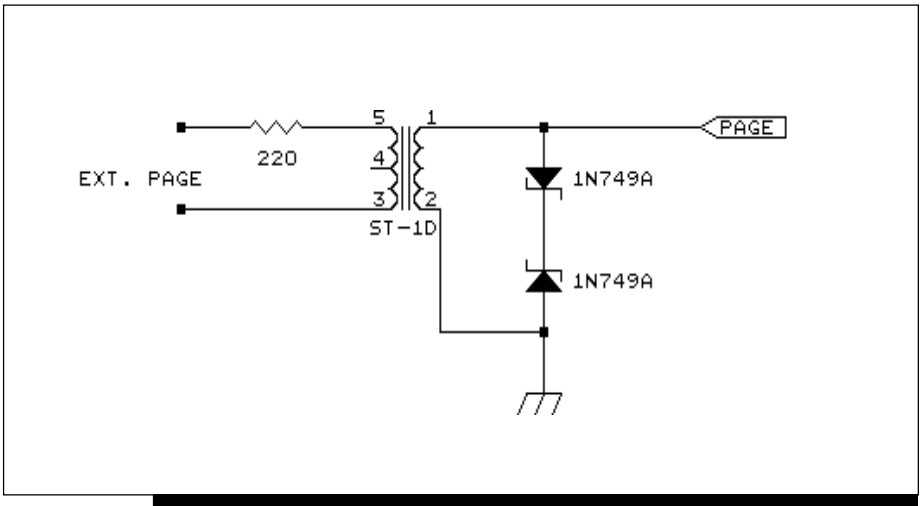
The opto-coupler chip detects the status of the call button at door-phone.
The user can make a call to door-phone and also receive a call from door-phone.

DOOR-PHONE INTERFACE CIRCUIT

The lock release control is composed of a relay and a spark killer. This controls two signal wires connected or disconnected. Enabling the control means that relay control contact is connected during the preprogrammed period.

2.10 EXTERNAL PAGE INTERFACE CIRCUIT

The system is equipped with the external page interface on the DPH/PAGING D-B*d which enables the subscriber to make a page through the external speaker.
The interface is simply composed as a power-isolated speech path and you should connect the external speaker with the amplifier. Otherwise, the level is too small to hear because the interface is not equipped with any speech driver.
The connection can be accomplished through Audio Jack.



EXT. PAGE INTERFACE CIRCUIT DIAGRAM

One transformer ST-1D for power isolation and Zener diodes for network protection from over-voltage are all to be required.

The interface does not have any level-adjust so you may adjust the level at the external amplifier.

2.11 CPU AND CONTROL LOGIC

CPU and Control logics exist in the main Base B'd and control all of the system operations and features.

They are composed of CPU, reset circuitry, memory and decoders.

2.11.1 CPU(Central Process Unit)

NX system is equipped with **HD64180R** as its CPU that is supplied by Hitachi.
The **HD64180** combines a high performance CPU core with many of the systems and I/O resources.

The five functional blocks of the CPU core are; (• : using part)

- • Clock Generator
- ○ Bus state Controller
- ○ Interrupt Controller
- • Memory Management Controller (MMU)
- • Central Process Unit (8-bit CPU)

The integrated I/O resources comprise the remaining four functional blocks; (• : using part)

- ○ DMA Controller (DMAD - two channels)
- • Asynchronous Serial communication Interface (ASCI - two channels)
- ○ Clocked Serial I/O port (CSI/O - one channel)
- • Programmable Reload Timer (PRT - two channels)

The system clock is provided by 12.288 MHz crystal, and it's one machine cycle is about 160 nanoseconds that results from the system clock divided by 2.
For good oscillation without distortion, two bypass capacitors are attached to the terminal of the crystal.

This CPU has the internal oscillation circuit and any additional oscillator may not be required. CPU operates with +5V power, system clock and reset-free. You may check the three factors if you have any troubles.

This chip supports 512 Kbytes Memory and 64 Kbytes I/O Address space.

2.11.2 Reset Circuit

To protect CPU from an electrical shock or trap, a reset circuitry may be needed, which is generally composed of a voltage level detector and a watch-dog circuit.

The reset circuitry of the system consists of a micro-monitor chip **DS1232**.

DS1232 Chip monitors two vital conditions of CPU; Power supply level variation and watch-dog timer.
This circuitry is designed to supply power ON signal (500 msec) to the CPU when turning the system ON and the level of +5V power is over 4.5V. Before turning on the power, the power tolerance of DS1232 (TOL pin) must be connected to +5V.
The purposes of the **Power-On Reset** is;

- To initialize the essential hardware (CPU, Relay driver and some logics, etc.) of the system when turning the power ON.
- To prevent all the components from misoperating.

2.11.2.1 Voltage Level Detector

Level detector detects the variation of +5V and. It resets CPU. Its memory logic and another logic part for protection, if that power is under-range.

The level detector protects CPU and Memory back-up data from power variation, which stabilizes the CPU operation and enhances the system reliability.

DS1232 Chip detects the +5V power and resets the system when the power is under + 4.5V.
The Push-button reset (PB input Pin) of DS1232 checks the +28V power that is driven by the first output of AC/DC converter, resets the system and operates the POWER LED of LED indicators.

The ALR8054 checks the variation of +28V power using the resistors that divide the voltage.
The Reset signal is released then the +28V power is over +20V and supplied to halt the system when the power is under +16V.

Therefore, the system is designed to operate when the stable power (over +20V) is supplied and reset when unstable power (under +16V) is supplied. That protects the system from misoperating. Users can easily detect this feature through the POWER LED of LED indicators.

2.11.2.2 Watch-dog Circuit

A watch-dog circuit monitors the CPU operation and resets CPU if an abnormal status is detected to prevent from the unpredicted program trap or circuit trap.

Watch-dog circuit is in the micro-monitor chip DS1232. If there is no strobe signal within 1 sec at Pin 7 of DS1232, the Reset signal is generated at Pin 5 (RST) and Pin 6 (RST).

The system program memory consists of program memory and data memory. The system program memory of all the NX systems is 256 Kbyte EPROM (27C020). The system data memory is 32 Kbyte SRAM (62256) or 128 Kbyte SRAM(681000). The NX-308 system uses one SRAM (32 Kbytes) and the NX-820 and NX-1232 systems use one SRAM (128 Kbytes) for system data memory.

Program memory has all instructions for system operations. Data memory has all data to control and to be programmed by users. Data memory may be protected with back-up circuit when power fails.

Memory controls are activated only when the ME signal is low. I/O Controls are activated only when the IOE signal is low and the control signal is divided by some decoders.

2.12 RTC (Real Time Clock)

The system is equipped with a real time clock, **MSM6242BRS**, which provides the precise time base for the current time.

It has a one-chip oscillator for **32.768 Khz** crystal of which time base is divided to addressable 4-bit I/O data for seconds, minutes, Hours, Day of week, Date, Month and Year.

The chip has two Chip-Selectors; One (CS, Pin 2) is activated in Low and connected to one output of the I/O decoder, and the other (CS, Pin 15) is activated in High that operates with level detector of Memory back-up. The second Chip Selector prevents the internal data from being damaged while power failure.

The time base of the real time clock while power failure, you should move the shunt pin (Memory back-up switch) on the main base B'd to ON position after installation.

To adjust good oscillation, chip is equipped with two fixed capacitors (20 pF).

2.13 MEMORY BACK-UP CIRCUIT

The memory back-up circuit protects **the data of back-up memory** and the **RTC(Real Time Clock)** while power fails.

The circuit consists of Ni-Cd battery, level detector, some gates and diodes, back-up ON/OFF switch (shunt pin) and some passive devices.

You should move the shunt pin to ON position immediately after installation. Otherwise, the data of back-up memory and RTC may be volatile while power fails.

The main device is the Ni-Cd battery, which is rechargeable battery and has a smaller capacity than lithium battery. The battery provides the maximum of 60 mAH and the capacity may decrease in proportion to time.

The main load to the back-up power is the power consumed at the static RAM and the real time clock chip.
Considered with the maximum load, the duration of the battery is about 18 days. In the typical situation, the duration can be up to 200 days. The difference is too large and it is difficult to test the practicable system.

Our factory guarantees seven days for the memory back-up.

2.14 CPD (CALL PROGRESS DECODER)

CPD (Call Progress Decoder) monitors the call during automatic redial or the busy tone during conversation.

This decoder is optional feature on the DPH/PAGING D-B'd.

The system provides automatic redial feature that enables to repeat the outgoing call automatically if the opposite party is busy. CPD enables the system to detect that the receiving signal is busy tone or not.

The system is equipped with SSI75T980 for call progress decoder. on the DPH/PAGING D-B'd. The system provides automatic redial feature that enables to repeat the outgoing call automatically if the opposite party is busy. CPD enables the system to detect that the receiving signal is busy tone or not.

The system is equipped with **SSI75T980** for call progress decoder.
The chip has eight pins for connection and detecting Dial Tone, Ringback Tone, Busy Tone or Reorder Tone by tone cadences.

The CPD has to be provided with the external crystal for reference frequency supply, which is driven by the internal oscillator. (3.579545 MHz crystal should be connected.)

2.15 VOICE ANNOUNCEMENT SERVICE CIRCUIT

This circuit is equipped only on the DPH/PAGING optional D-B'd, and used for the voice message features; **Record/Play the voice messages.**

The circuit consists of two ports for simultaneous servicing, 32 seconds voice-recording/playing feature that can be divided to four channels per port. Each channels is for the voice-announcement message and intercom message.

For the voice-announcement message service, the circuit mainly consists of ADPCM (Adaptive Delta Pulse Code Modulation) speech processor **MSM6258GS** and one **681000 (128 Kbyte) SRAM**.
The processor can record an analog signal to SRAM by ADPCM, and may reproduce the recorded signal. The integrated A/D and D/A converters (internally comprised), make the chip more self-contained, relieving the needs for external conversation circuitry. Additionally, the ADPCM samples the signal by 4 bit-length, and the number of recording phrases may be also selected in application. (Up to 4 phrases(channels))

For signal recording, the handset or the external MOH should be used, and the received signal can be connected to the speech processor through the network, amplified, sampled and stored to SRAM.

For signal reproducing, the stored data are gotten from SRAM, converted to the analog signal, amplified and transmitted to network.
In the network, the signal may be switched to the trunk interface for sending the intercom voice

message or outside voice-announcement message.
Latch chip (74HC374) is applied to control recording/reproducing, selecting, starting, selecting channel and checking existence of VMS.

2.16 AC/DC CONVERTER

The system is equipped with AC to DC power supply for its operation.

110 VAC or 220 VAC are allowable of which frequency is 50 Hz or 60 Hz. The input power may be selected with the location of TAP Connector. And, the system has an ON/OFF control switch for connecting or dis-connecting the input power to the system.

AC input is composed of three terminals; *AC high, AC low*, and *Earth terminal.*

The earth terminal is provided from the local electric company or the electric transmission pole, which is used for the protection circuitry. To ground the system is very important for system protection from any damage, so the system provides the additional earth plug where the earth terminal of AC power is not surged.

The AC power through the ON/OFF control switch is fed to the AC power fuse and the protection circuitry. The fuse capacity is 1A, 250V and protects from the input over-voltage and the output shortage.

The **protection circuitry** is composed of **3 varistors**, which enhance the system noise and surge blocking. The varistor is applied differently as the input voltage; 470 V varistor for 220 VAC and 220 V varistor for 110 VAC. The varistor is parallel connected between AC high and AC low terminal for the normal mode protection. Any over-voltage input is clipped to the level of the varistor and the fuse may operate to blow at that case. Another varistor is installed between AC low and the earth for the common mode protection of which clipping level is 420 volt. Any over 420 V input in common mode will be stuck to the earth and the power fuse blows at that case. As above, the circuitry protects the system from any over voltage of the AC power input.

The power through the protection circuitry is fed to the **power transformer**. The power transformer isolates the output from the input and provides the output according to the turn rati o. The primary turn is center-tapped for the reception of the input based on the power level. Full turn is for 220 VAC input and the center-tapped terminal is connected to 110 VAC input. The secondary turn is separated to two parts; one for the main power source and the other for charging the external battery. The output of the main secondary turn is also a sine wave, which is fully rectified by the following bridge diode. The rectified wave is regulated by the large capacitance capacitor (10000 UF/50 V). With the capacitor, the waveform is as DC and the regulation is some different as the load variation, which has a little power signal as a rippl e.

Therefore, the output is regulated again to the SLT DC Feeding circuit.

The AC/DC conversion is accomplished with the power transformer and the output is directly affected by the variation of the input power level. Some of the high frequency noises may be prevented to be transferred. But the AC level (50/60 Hz) is an important factor in this circuit,

because the power level is some deviated at the site according to their electric transmission center or the distance. And the output may fall as the load increases.

For stabilizing the system from the line voltage and load variation, the main secondary turn provides the additional supply that can be controlled with a relay. The relay is driven by the compare (**MC1458**) of which the detection level is determined as following;

> The reference voltage is varied as the output. If the output is high, the reference voltage is the sum of the zener voltage and two forward diode voltages, about 7.1 volt. If the output is low, the reference voltage is the value of the zener voltage minus two forward diode voltages, about 5.3 volt. The high and low threshold voltage is different because of the reference variation.

The input of the comparator is fed from the regulated output. The calculated value may be varied according to the component tolerance a little.

After power up, the relay turns ON to provide the sufficient power. And, the relay might be OFF when the regulated output rises up to the high threshold voltage (34.8V). Owing to the line voltage and the load, the regulated output may decrease down to the low threshold voltage (26.0V). Then, the relay will be driven to ON for the sufficient supply.

One fourth of the main secondary turn is added when the relay turns ON. Therefore, the output will be added to 25% increase compared with the current level.

For the secondary output compensation, MC1458 is used as comparator. Zener diode with four signal diodes provides the high/low threshold voltage. Resistor R16 gives the Zener current, resistor R13 provides the signal diode with forwad current, and the resistor R17 and R22 feed the input variation to the inverting terminal of the comparator. The diode for rectification (1N400 4) prevents the inverse electro-motive force from affecting the driver and the transistor (C1009Y) drives the relay directly.

As already explained, the regulated output may have a ripple according to the line voltage and load. It may be called as semi-regulated DC. The output is fed to Connection B'd.

2.17 SYSTEM BACK-UP INTERFACE

The system may continue the full system operation during AC power failure or "brown-outs" when a 24V battery supply is connected. At the Power Supply board charging and discharging circuits are prepared for the external battery. The system back-up interface is composed of **battery charge circuit, battery discharge circuit,** and **protection circuit.**

2.17.1 Battery Charge Circuit

Battery Charge Circuit is for charging the battery while AC power fed.

At first, a switch is prepared to control the path of charging. The path switch is composed of a transistor (TIP42C) and resistor R33 (1.8K). If the transistor turns ON, the external battery can be charged. Otherwise, charging process may be clocked owing the large resistance of R33.
A low level input to the transistor can be driven by the comparator, LM393.

The driving point may be decided as following;

The inverting terminal is provided with a reference voltage, 6.2 V of Zener voltage (1N 4735A). And the input is fed to the non-inverting terminal, which is provided from the battery through a signal diode, some resistors, and a variable resistor. With the structure of the circuit, you may get the detected level.

The transistor can be driven by the comparator of which the detected value is as above. In factory, it is recommended to adjust the level to 28.0V.
Therefore, the charging path is still connected until the battery level is over 28.0V, which protects the battery from over-charge. It is usually called as Over-Charge Protection Circuit.

After the over-charge protection switch is connected serially, which prevents over-current flow while charging. Because any over-current may interfere the main DC to fall and it may activate system restart.

The rectifier diode, 1N4004, prevents any reverse current flow while discharging or AC power failure.

The battery charge voltage is supplied from the sum of the main DC and the DC provided with the additional turn of the secondary turn. At normal, the additional turn and the following bridge diode and capacitor provide 6V DC. Therefore, the battery charge voltage is always higher than the main DC at the rate of 25% or 20% according to the power compensation relay.

2.17.2 Battery Discharge Circuit

Battery Discharge Circuit consists of a **power TR** and **rectifier diodes**.

The rectifier diodes, **1N5401** prevents any reverse current flow while there is no reason to discharge from the battery. The rectifier diode has larger capacity, 3A than 1N4004, 1A.

The **power TR** is driven by the comparator, LM393. High output turns the power TR OFF and the TR will be open. At this case, the discharge path is disconnected. Low output turns the power TR ON and the discharge path will be connected for the system to operate with the battery power.

The comparator output is determined by the input level. The non-inverting terminal is provided with the reference voltage by a zener diode and two signal diodes. The Zener diode provides 6.2V zener voltage and the signal diodes provide the hysteresis. Owing to the signal diodes, the reference level varies to 5.75V or 6.65V according to the comparator output. The additional comparing circuit with LM393 provides a driving current for the signal diodes.

The inverting terminal is provided with the battery voltage, which is adjusted to an adequate level divided by some resistors. The detection level may be known as following;

$$High\ Detected\ Level = (VR + R15 + R25 + R21)/(R25 + R21) * 6.65 + 1.1$$
$$= 24.6V$$

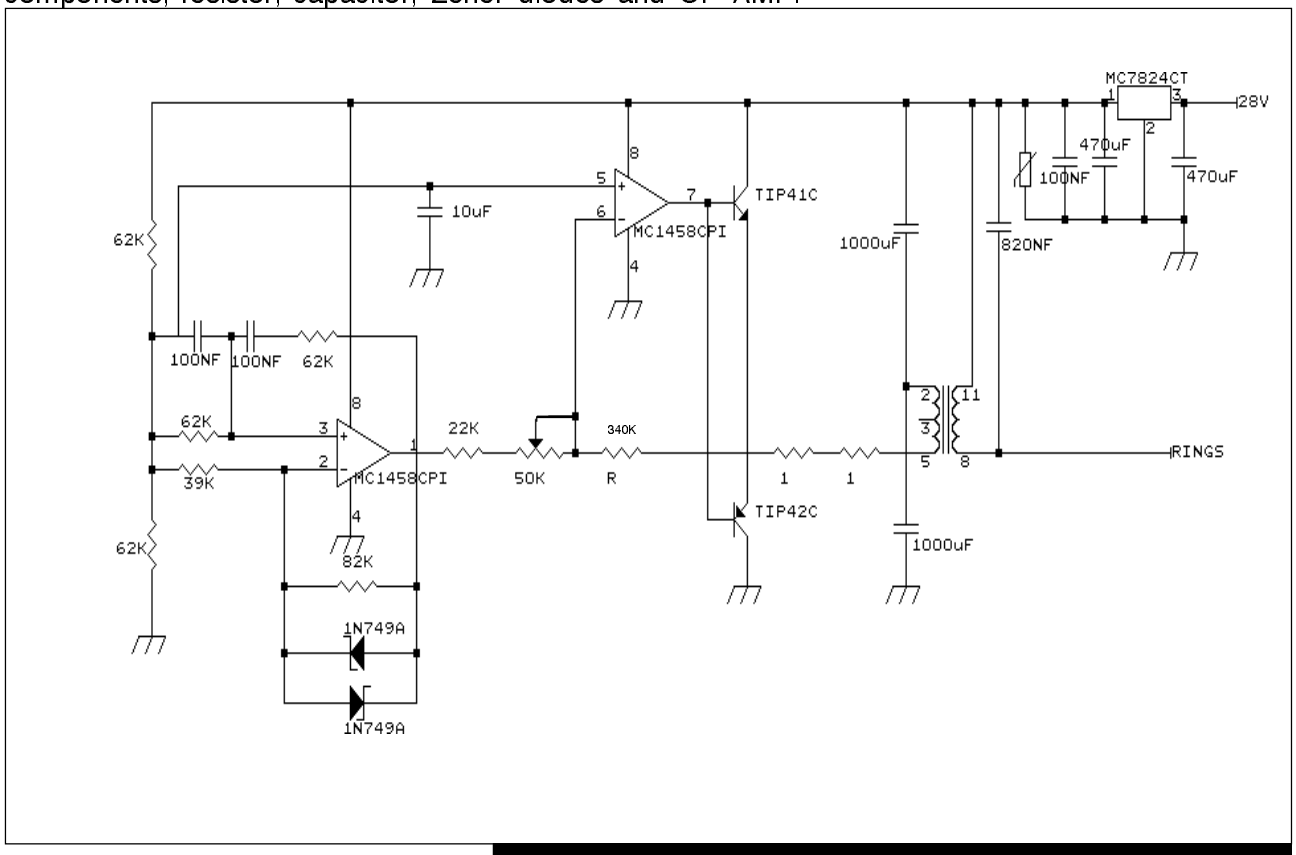
*Low Detected Level = (VR + R15 + R25 + R21)/(R25 + R21) * 5.75 +1*
= 21.4 V

At the above equation, the resistance of the variable resistor has one value because the value is already set while adjusting the over-charge protection level.

2.18 RING SIGNAL GENERATOR

Ring Signal is provided to single line telephones for on-hook signaling which indicates a call. The system provides 75 Vrms (25 Hz) which is sine wave signal. Ring signal generator has two parts; amplifier part and 25 Hz signal generation part.

25 Hz AC signal is generated by the **Wien Bridge oscillator** which is included other components, resistor, capacitor, Zener diodes and OP AMP.



RING SIGNAL GENERATOR CIRCUIT DIAGRAM

Another OP AMP amplifies 25 Hz AC signal which is generated by Wien Bridge oscillator. So, 25 Hz AC signal is generated and alternates the DC 24V power with TR.

Power transformer (SKP-RT) transforms to high voltage ring (AC 75 Vrms 25 Hz). And C18 capacitor is used for shortening to the load regulation.

The generated ring signal is transferred to the necessary SLT ports.

2.19 POWER REGULATOR

Regulated DC is provided for power feeding to single line telephones and tie lines. The main DC from power supply board can not be used owing to the ripple which results in the hum noise.

A simple linear technique is used for regulation. The transistor Q3 and Q5 are composed for darlington circuit to improve the gain and to decease the loss, which are the pass elements of the linear regulator. The zener diode ZD2 provides a reference voltage, and the resistors R32 and R24 give the feedback to control the pass element.

The output level is determined as following;

*Output = (R32 + R24)/R24 * (6.2 + 0.6)*
= 23.8V
(6.2 is the zener diode voltage and 0.6 is the BE voltage of transistor)

The output voltage may vary from 22.8V to 24.9V according to the zener tolerance.

Generally, as already described, a linear regulator has a low efficiency and low noise output. But the linear regulator as this has a good efficiency owing to the small drop between the input and the output. In the regulation circuit, the largest factor to decrease the efficiency is the performance of pass element. The pass element is composed with darlington circuit to increase the gain, which enhances the performance and reduces the loss.

Plus 12V regulator uses the **linear technology** and all the necessary circuitry is combines to one chip **7812**, which is supplied by some semiconductor manufactures. For small power-consumed system, the linear technology is popular owing to the low price and the simple application circuit with the related chip. Only the input and output capacitors are necessary for the additional devices. Only the input and output capacitors are necessary for the additional devices. In addition, a small capacitance capacitor may be available because of the minute noise. The system uses the larger capacitance device for more stability but it is the designer*s groundless apprehensions.

For the +12V regulator, the main DC from power supply board is fed. The electrical characteristics of 7812CT are as follows;

- Maximum Input Voltage 35V
- Output Voltage 11.4V min., 12.0V typ., 12.6V max
- Line Regulation 13mV typ, 240mV max
- Load Regulation 46mV typ, 240mV max
- Quiescent Current 4.4mA typ, 8.0mA max
- Ripple Rejection 60dB typical
- Dropout Voltage 2.0V typical
- Output Resistance, 1Khz 18mohm
- Short Circuit Current 0.2A typical
- Peak Output Current 2.2A typical
- Temperature factor of output 1.0mV/C

+12V is mainly used for sending data to keysets and providing the power to door-phone.

For ring generating, a **linear regulator** (DC/DC converter) is used. The 7824 outputs the 24V DC, which is fed to the ring transformer. For a reference, the technology of power supply is largely divided to two; Linear regulator and Switching Regulator. The linear regulator has a low efficiency and noise and the switching regulator has a high efficiency and noise. And, the switching regulator is more expensive than the linear. We usually use two technologies mixed. The switching regulators are used for high-consumed power and the linear regulators are used for low-consumed power. To design and apply the switching regulators needs the high notice to reduce the noise.

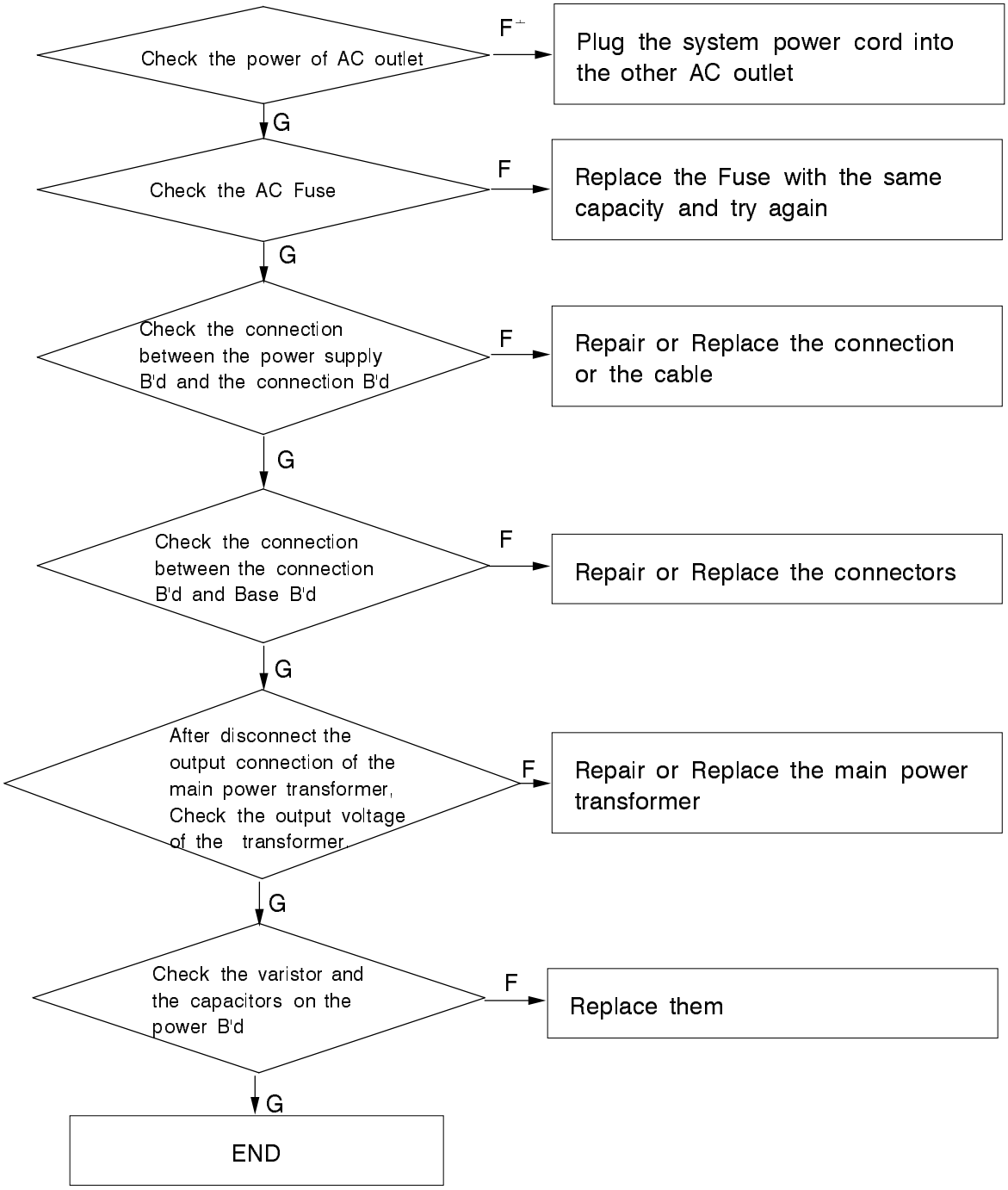
3.TROUBLE SHOOTING

3.1 POWER PART
3.1.1 Main Power Failure with AC power .....3 - 1
3.1.2 12VDC Power Failure .....3 - 2
3.1.3 -5VDC Power Failure .....3 - 3
3.1.4 +5VDC Power Failure .....3 - 4
3.1.5 24VDC Power Failure .....3 - 5
3.1.6 System Back-up Failure .....3 - 6
3.1.7 Ring Generator Failure .....3 - 7
3.2 CONTROL PART
3.2.1 Memory Back-up Failure .....3 - 8
3.2.2 Real Time Clock Failure .....3 - 9
3.2.3 Tone Generation Failure .....3 -10
3.2.4 Network Fault .....3 -11
3 . 3 SLT PART
3.3.1 SLT DC Feeding Failure .....3 -12
3.3.2 SLT Dial Pulse Detection Failure .....3 -13
3.3.3 SLT DTMF Detection Failure .....3 -14
3.3.4 SLT Ring Generation Failure .....3 -15
3.3.5 SLT Dial Tone Supply Failure .....3 -16
3.4 TRUNK PART
3.4.1 Trunk Ring Detection Failure .....3 -17
3.4.2 Trunk Access Failure .....3 -18
3.4.3 Trunk Dial Pulse Sending Failure .....3 -19
3.4.4 Trunk DTMF Sending Failure .....3 -20
3.5 KEYSET PART
3.5.1 Keyset Power Failure .....3 -21
3.5.2 Keyset Data-Comm Failure .....2 -22
3.5.3 Keyset Speech Failure .....3 -23
3.6 OTHERS
3.6.1 Power Failure Transfer (PFT) Failure .....3 -24
3.6.2 SMDR/R-MMC Failure .....3 -25
3.6.3 Door-phone Failure .....3 -26
3.6.4 Door Lock Failure .....3 -27
3.6.5 Internal Music Source Failure .....3 -28
3.6.6 External Music Source Failure .....3 -29
3.6.7 Internal Page Failure .....3 -30
3.6.8 External Page Failure .....3 -30

3. TROUBLE SHOOTING

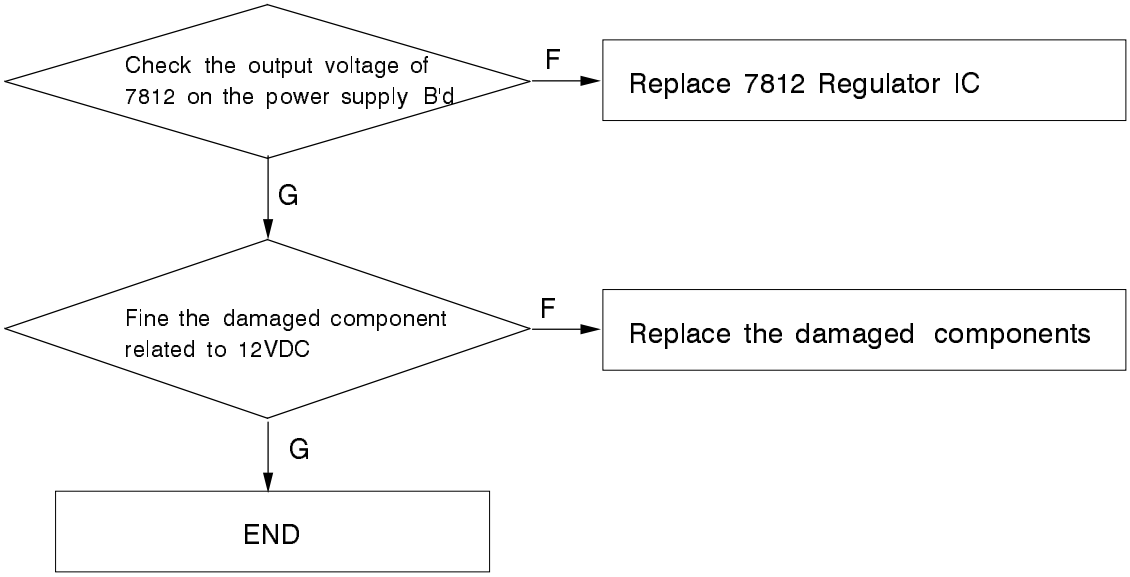
3.1 POWER PART

3.1.1 Main Power Failure with AC power


Check the power of AC outlet
F*
Plug the system power cord into the other AC outlet
G
Check the AC Fuse
F
Replace the Fuse with the same capacity and try again
G
Check the connection between the power supply B'd and the connection B'd
F
Repair or Replace the connection or the cable
G
Check the connection between the connection B'd and Base B'd
F
Repair or Replace the connectors
G
After disconnect the output connection of the main power transformer, Check the output voltage of the transformer.
F
Repair or Replace the main power transformer
G
Check the varistor and the capacitors on the power B'd
F
Replace them
G
END

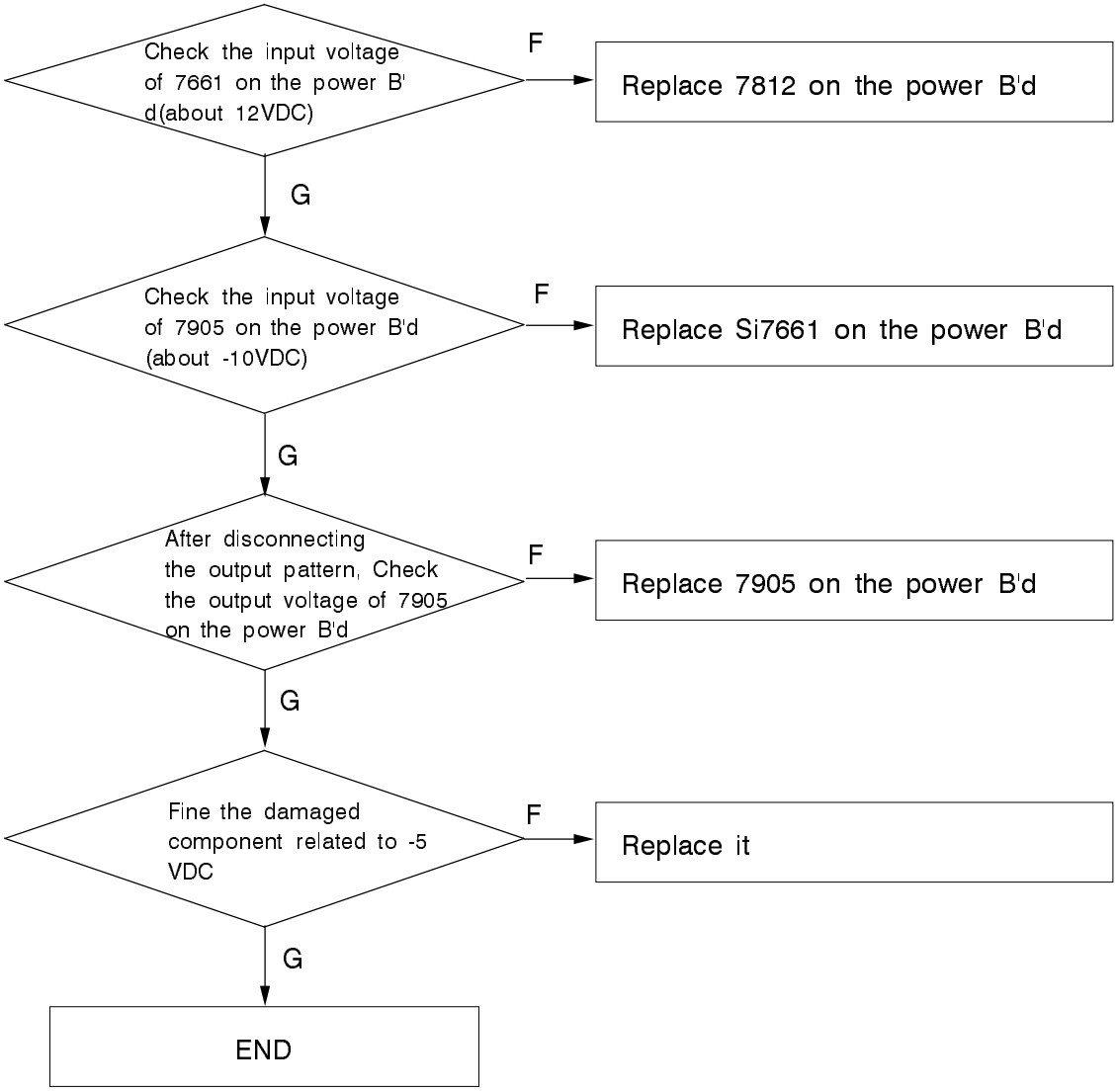
* Y : Yes
N : No
G : Good
F : Fail

3.1.2 12VDC Power[1] Failure



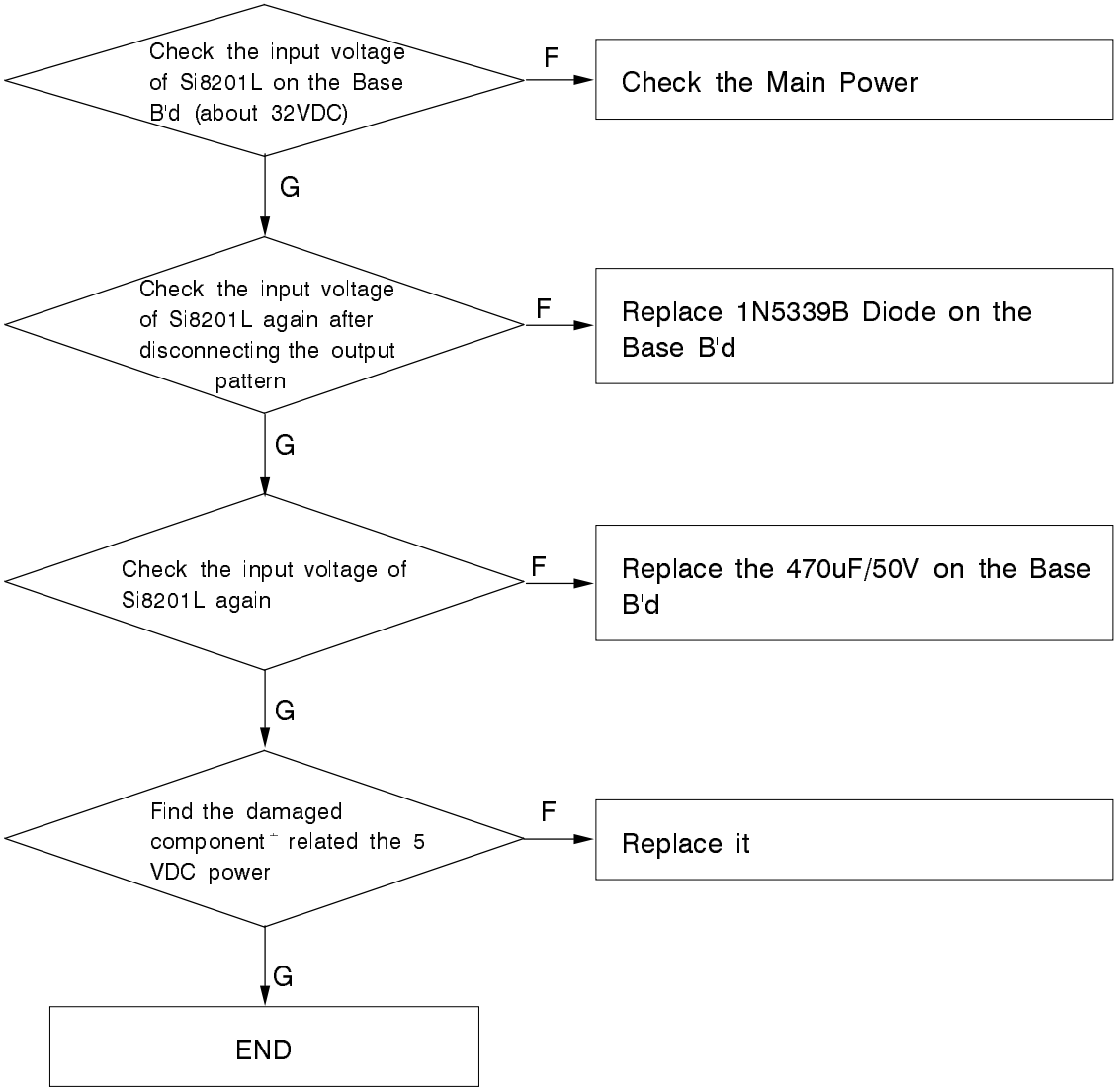
[1] This power is fed to keyset data-communication circuitry

3.1.3 -5VDC Power[1] Failure


Check the input voltage of 7661 on the power B'd(about 12VDC)
F
Replace 7812 on the power B'd
G
Check the input voltage of 7905 on the power B'd (about -10VDC)
F
Replace Si7661 on the power B'd
G
After disconnecting the output pattern, Check the output voltage of 7905 on the power B'd
F
Replace 7905 on the power B'd
G
Fine the damaged component related to -5 VDC
F
Replace it
G
END

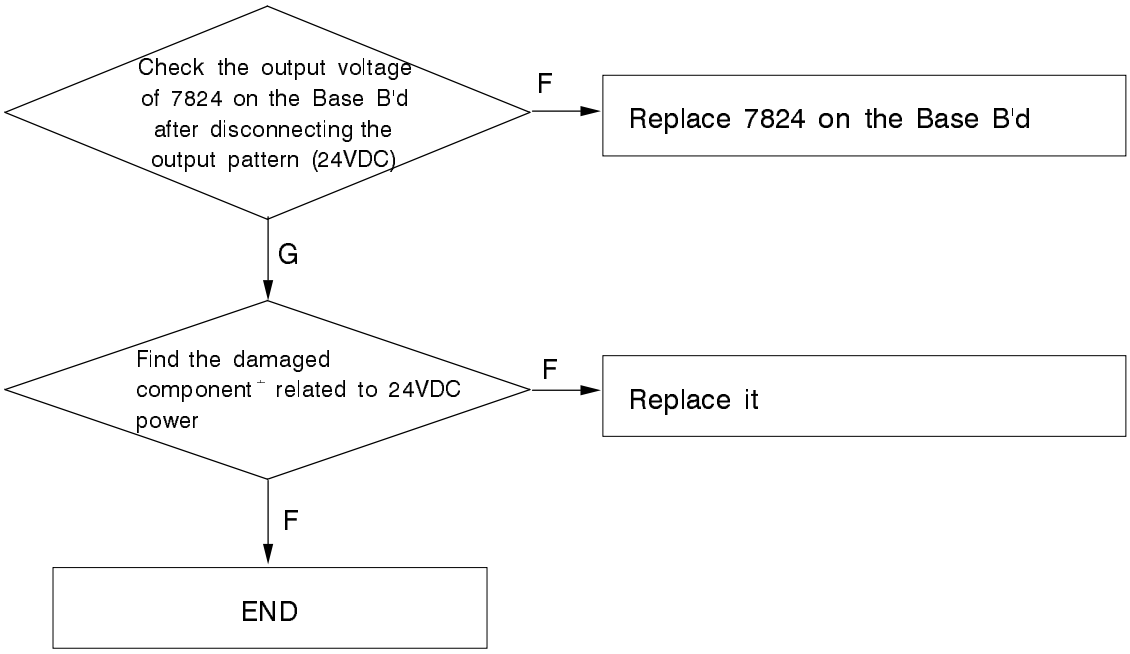
[1] This power is fed to network, speech circuitry

3.1.4 +5VDC Power Failure


Check the input voltage of Si8201L on the Base B'd (about 32VDC)
F
Check the Main Power
G
Check the input voltage of Si8201L again after disconnecting the output pattern
F
Replace 1N5339B Diode on the Base B'd
G
Check the input voltage of Si8201L again
F
Replace the 470uF/50V on the Base B'd
G
Find the damaged component* related the 5 VDC power
F
Replace it
G
END

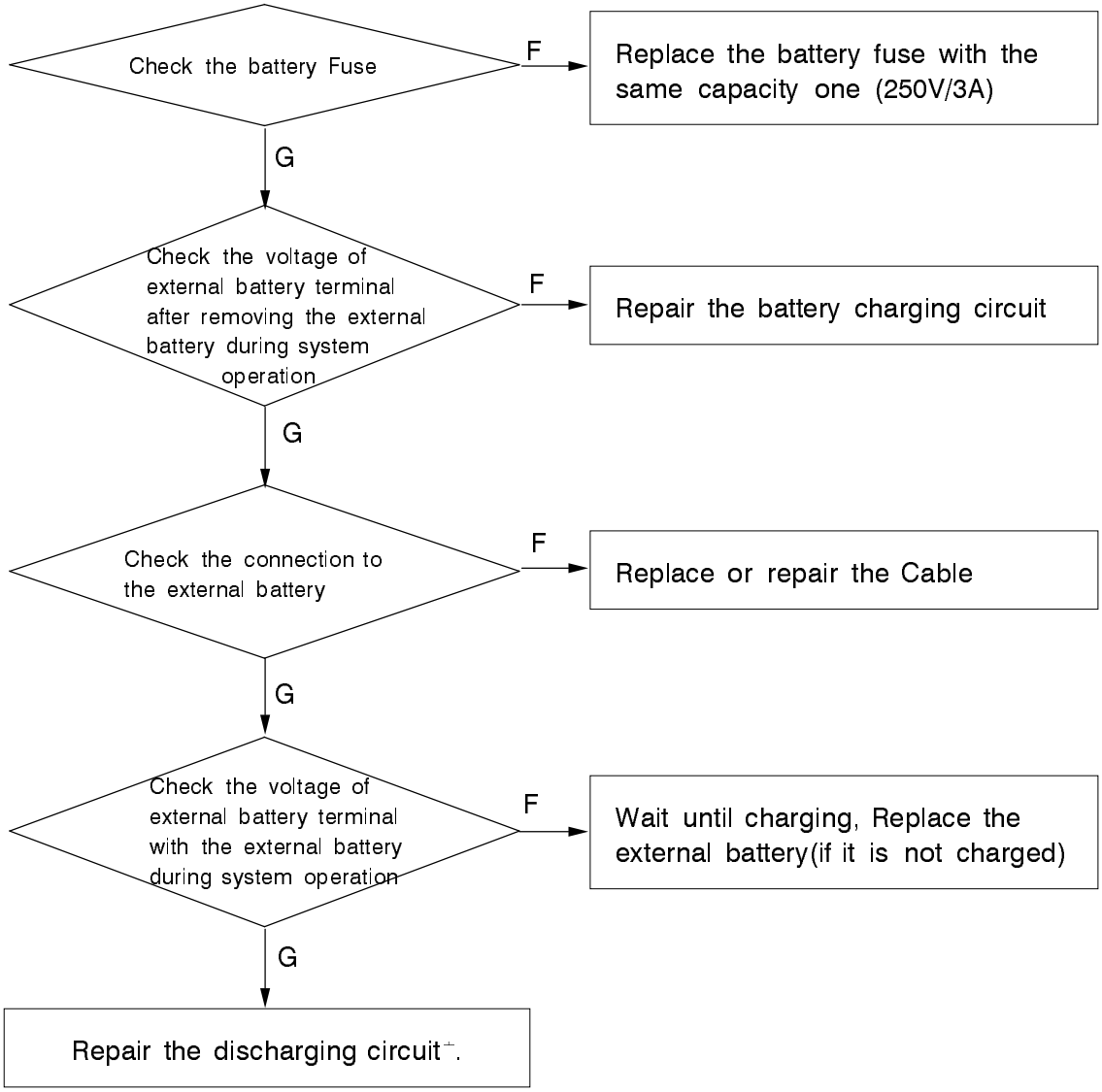
* This job requires so much time. Approach to the logic chips first near the regulator

3.1.5 24VDC Power Failure


Check the output voltage of 7824 on the Base B'd after disconnecting the output pattern (24VDC)
F
Replace 7824 on the Base B'd
G
Find the damaged component ¯ related to 24VDC power
F
Replace it
F
END

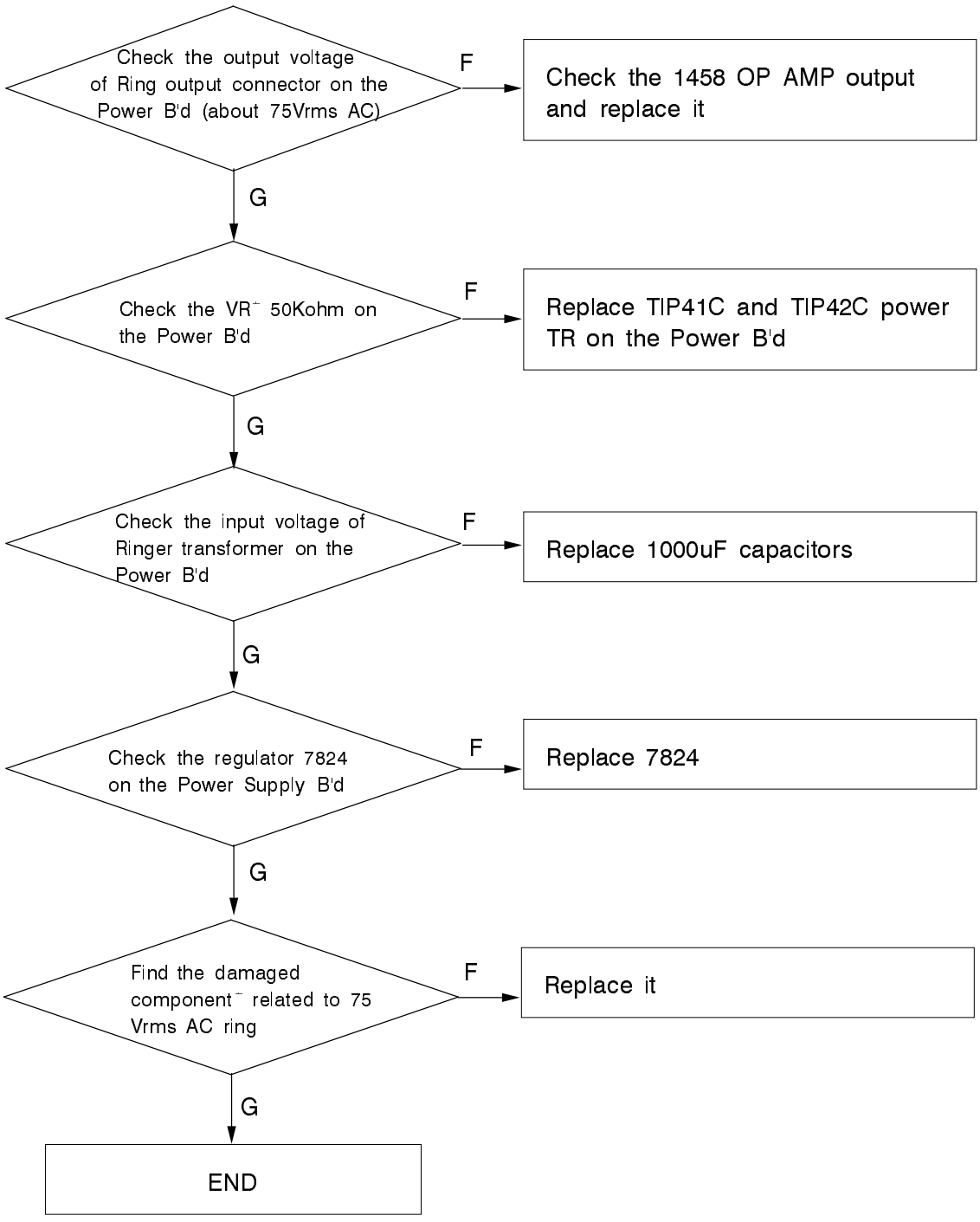
¯ This job requires so much time. Approach to the by-pass capacitors and transistors for relay drive

3.1.6 System Back-up Failure


Check the battery Fuse
F
Replace the battery fuse with the same capacity one (250V/3A)
G
Check the voltage of external battery terminal after removing the external battery during system operation
F
Repair the battery charging circuit
G
Check the connection to the external battery
F
Replace or repair the Cable
G
Check the voltage of external battery terminal with the external battery during system operation
F
Wait until charging, Replace the external battery(if it is not charged)
G
Repair the discharging circuit¬.

¬ Refer to the circuit description

3.1.7 Ring Generator Failure

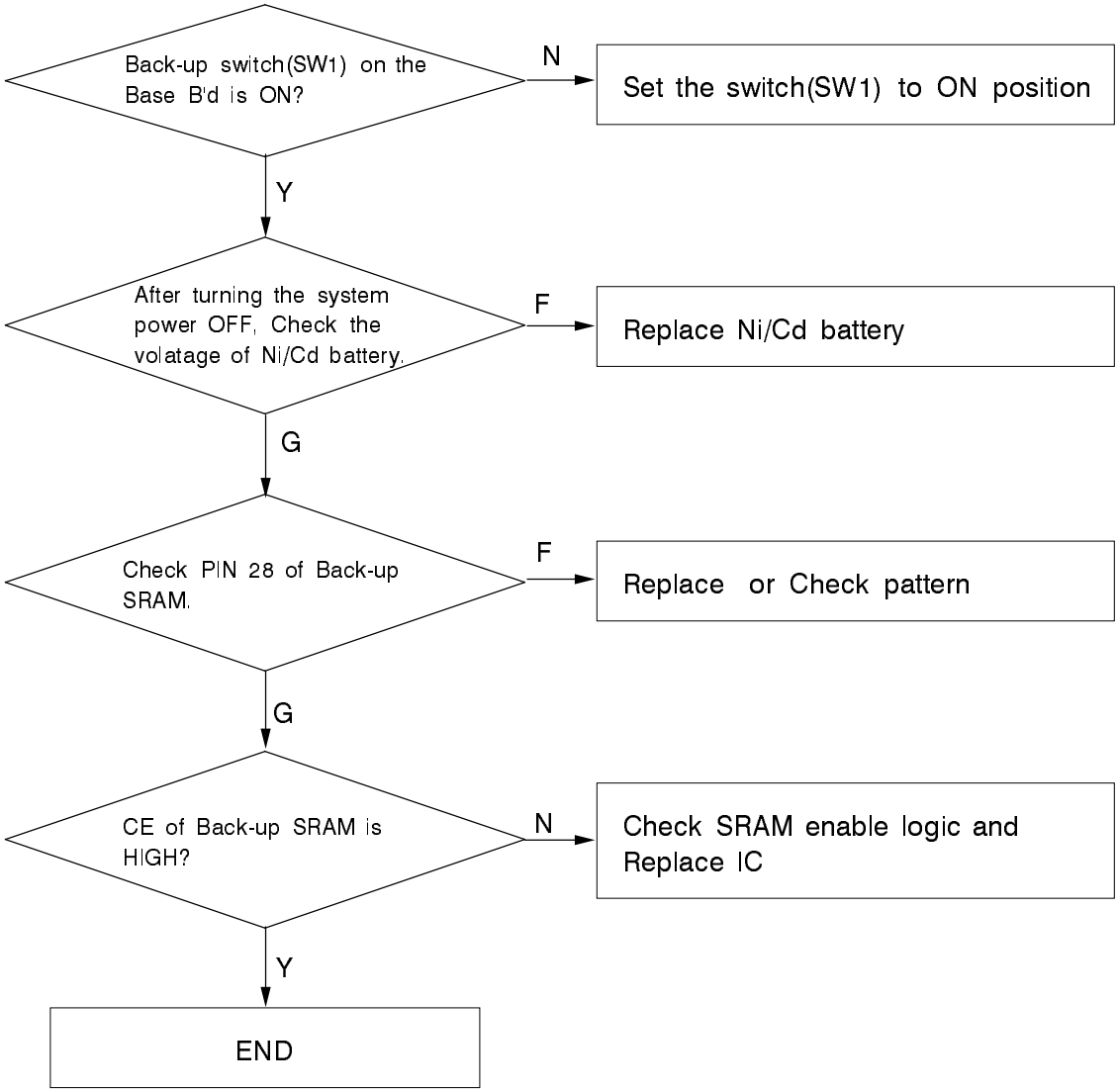

Check the output voltage of Ring output connector on the Power B'd (about 75Vrms AC)
F
Check the 1458 OP AMP output and replace it
G
Check the VR* 50Kohm on the Power B'd
F
Replace TIP41C and TIP42C power TR on the Power B'd
G
Check the input voltage of Ringer transformer on the Power B'd
F
Replace 1000uF capacitors
G
Check the regulator 7824 on the Power Supply B'd
F
Replace 7824
G
Find the damaged component** related to 75 Vrms AC ring
F
Replace it
G
END

* VR adjustment : Turning the VR to left, VR has 50 Kohm resistance. That resistance makes the ringer voltage 0V. Oppositely, turning the VR to right, VR becomes 0 ohm and the ringer voltage becomes 80 Vrms/25Hz

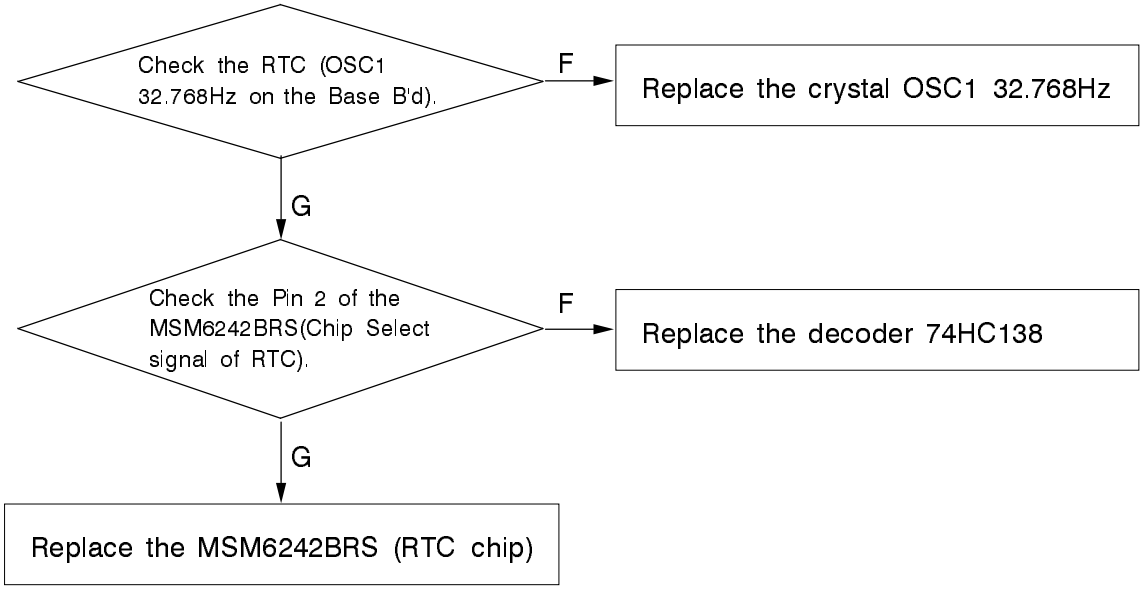
** Approach to the SLC Feeding Hybrid chips SLC03A on the Base B'd or Expansion B'd 4SLC and 8SLC.

3.2 CONTROL PART

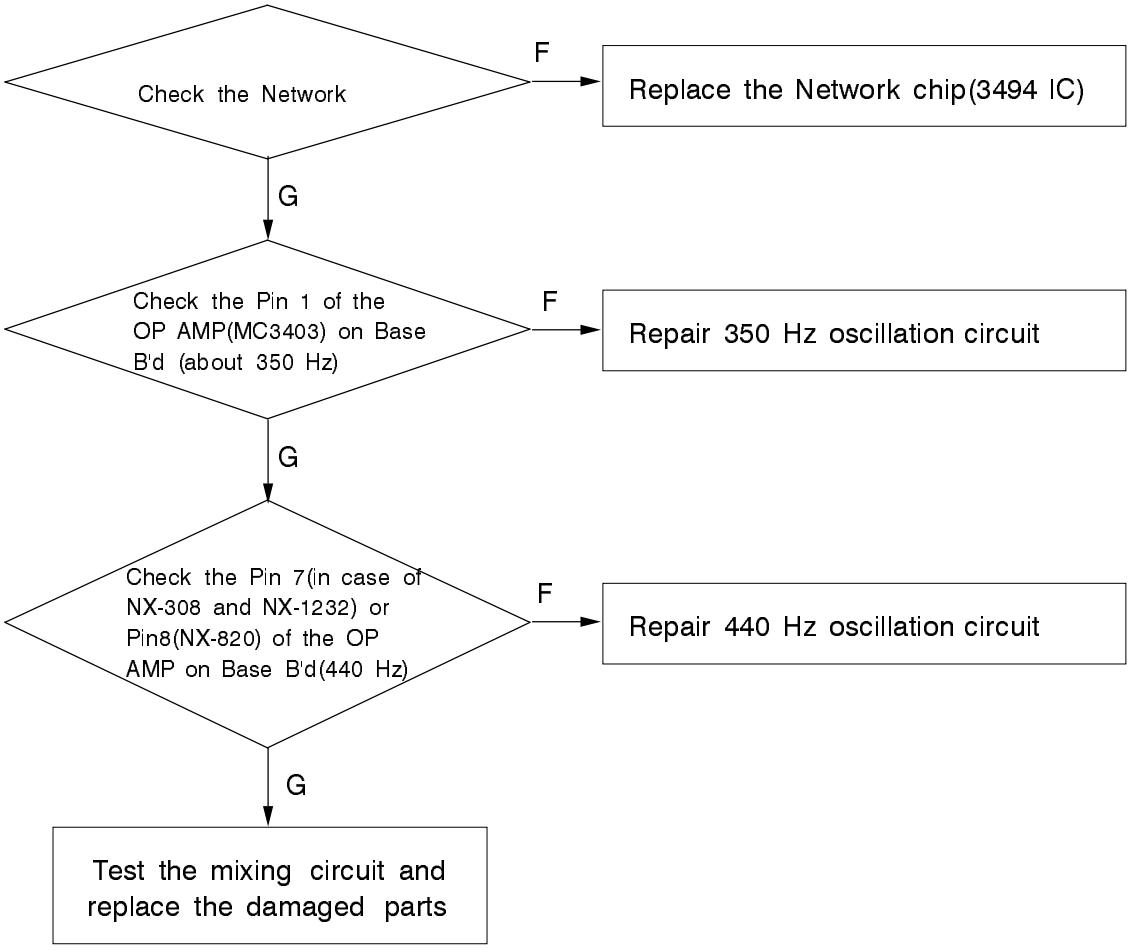
3.2.1 Memory Back-up Failure



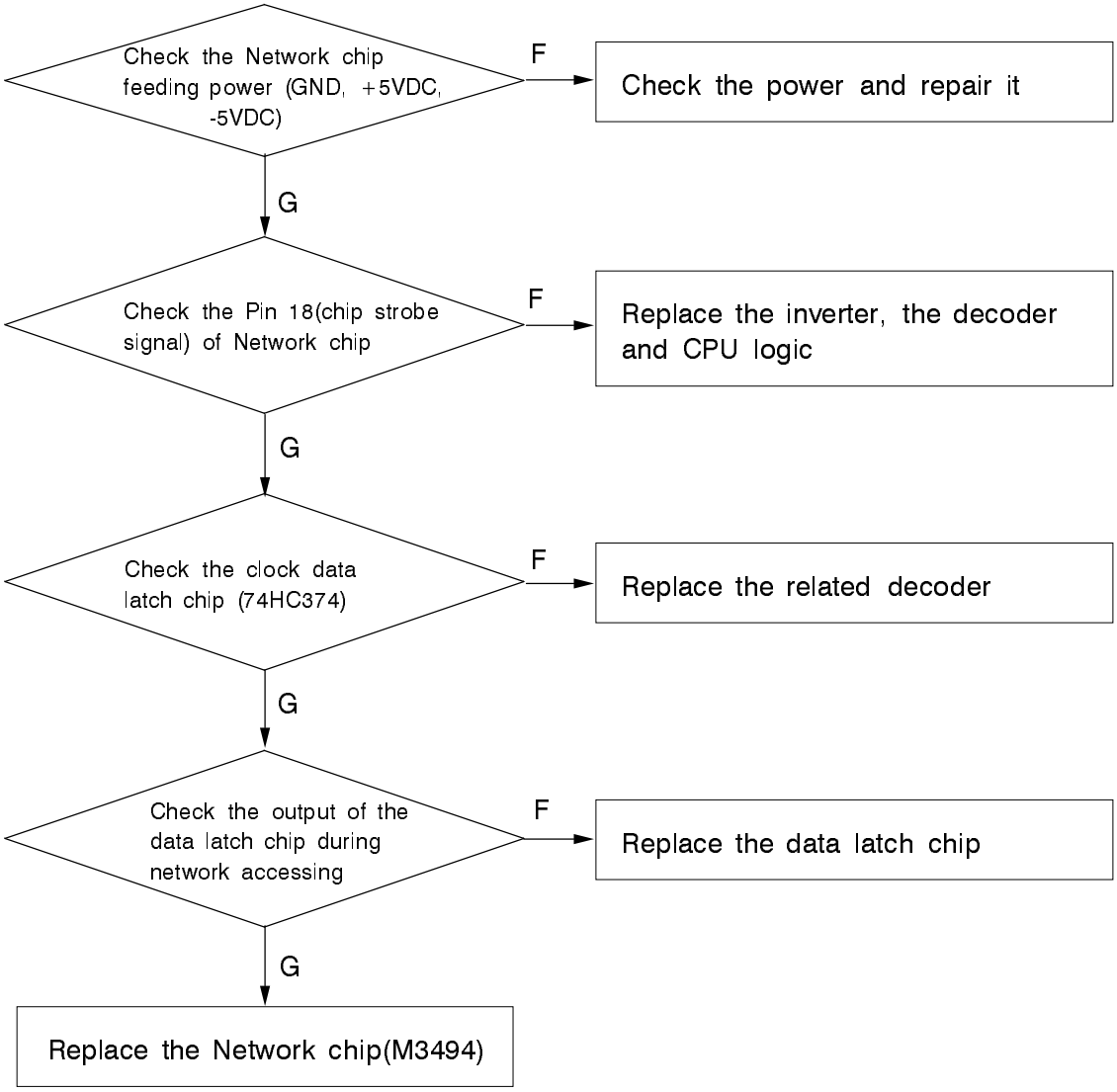
3.2.2 Real Time Clock(RTC) Failure


Check the RTC (OSC1 32.768Hz on the Base B'd).
F
Replace the crystal OSC1 32.768Hz
G
Check the Pin 2 of the MSM6242BRS(Chip Select signal of RTC).
F
Replace the decoder 74HC138
G
Replace the MSM6242BRS (RTC chip)

3.2.3 Tone Generation Failure

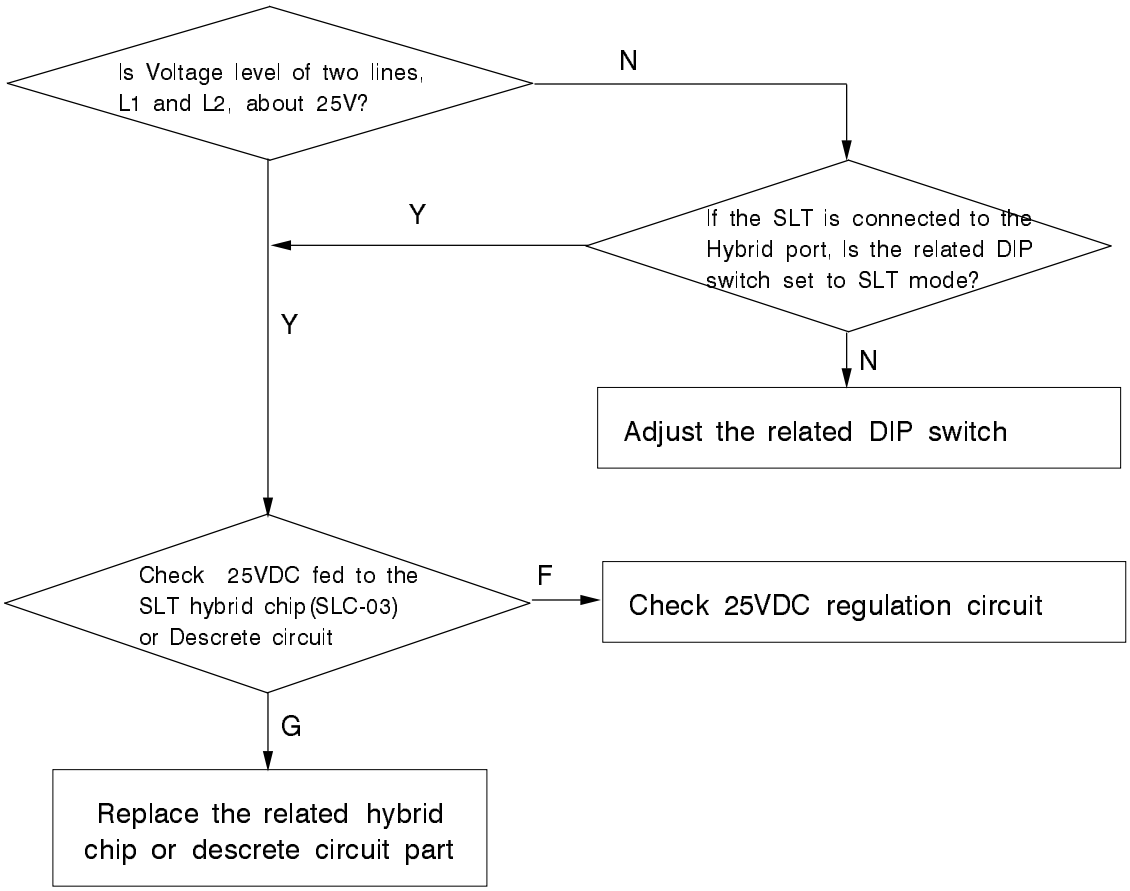

Check the Network
F
Replace the Network chip(3494 IC)
G
Check the Pin 1 of the OP AMP(MC3403) on Base B'd (about 350 Hz)
F
Repair 350 Hz oscillation circuit
G
Check the Pin 7(in case of NX-308 and NX-1232) or Pin8(NX-820) of the OP AMP on Base B'd(440 Hz)
F
Repair 440 Hz oscillation circuit
G
Test the mixing circuit and replace the damaged parts

3.2.4 Network Fault

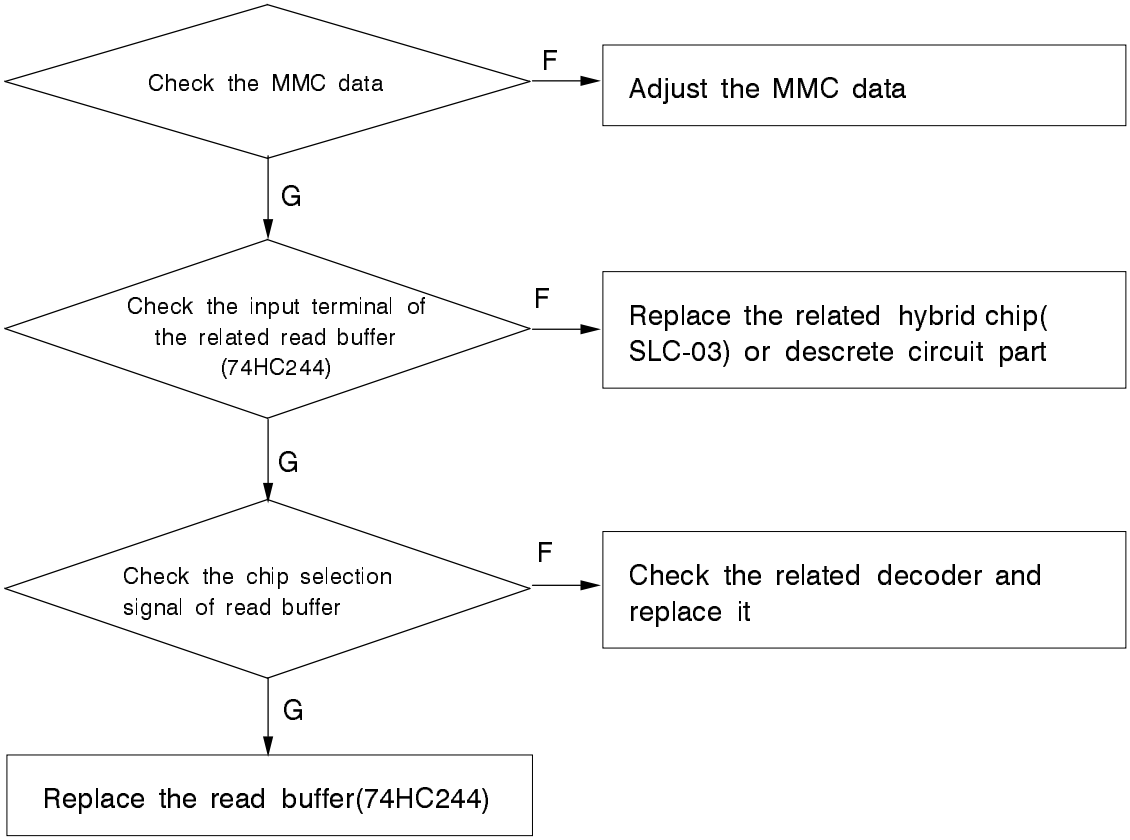

Check the Network chip feeding power (GND, +5VDC, -5VDC)
F
Check the power and repair it
G
Check the Pin 18(chip strobe signal) of Network chip
F
Replace the inverter, the decoder and CPU logic
G
Check the clock data latch chip (74HC374)
F
Replace the related decoder
G
Check the output of the data latch chip during network accessing
F
Replace the data latch chip
G
Replace the Network chip(M3494)

3.3 SLT PART

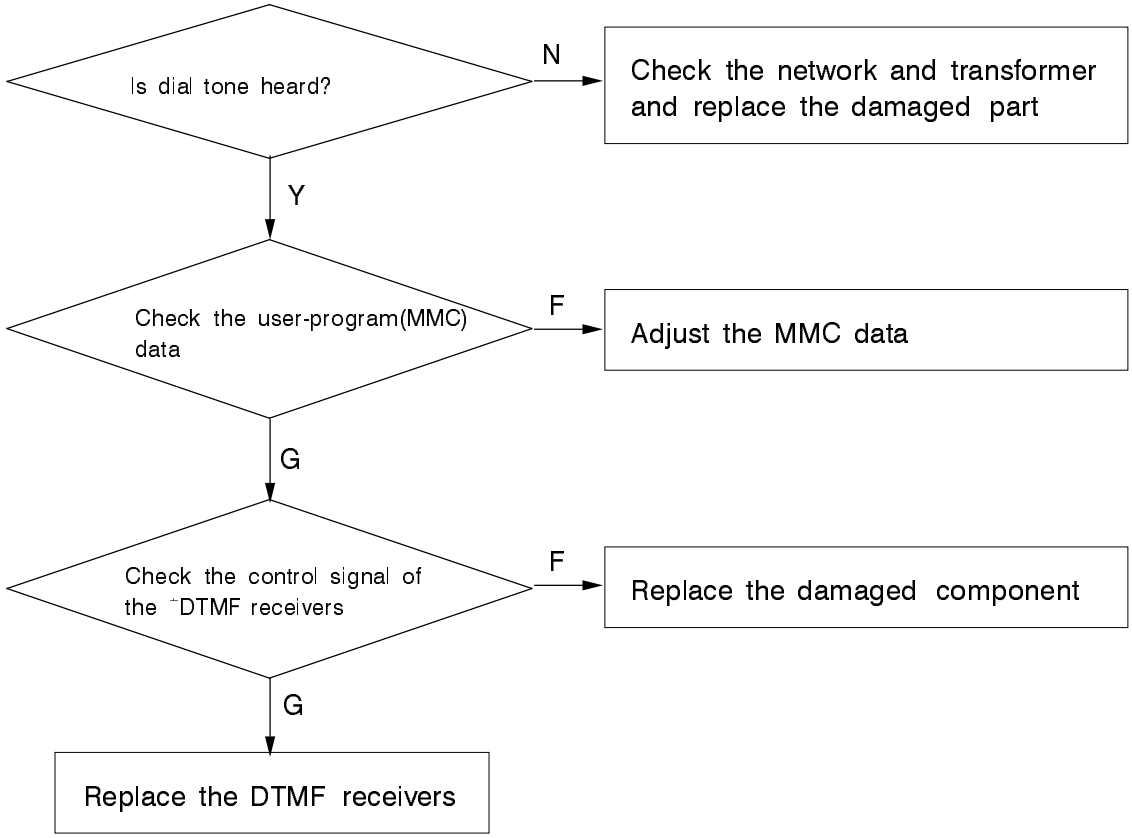
3.3.1 SLT DC Feeding Failure


Is Voltage level of two lines, L1 and L2, about 25V?
N
If the SLT is connected to the Hybrid port, Is the related DIP switch set to SLT mode?
Y
Y
N
Adjust the related DIP switch
Check 25VDC fed to the SLT hybrid chip(SLC-03) or Descrete circuit
F
Check 25VDC regulation circuit
G
Replace the related hybrid chip or descrete circuit part

3.3.2 SLT Dial Pulse Detection Failure

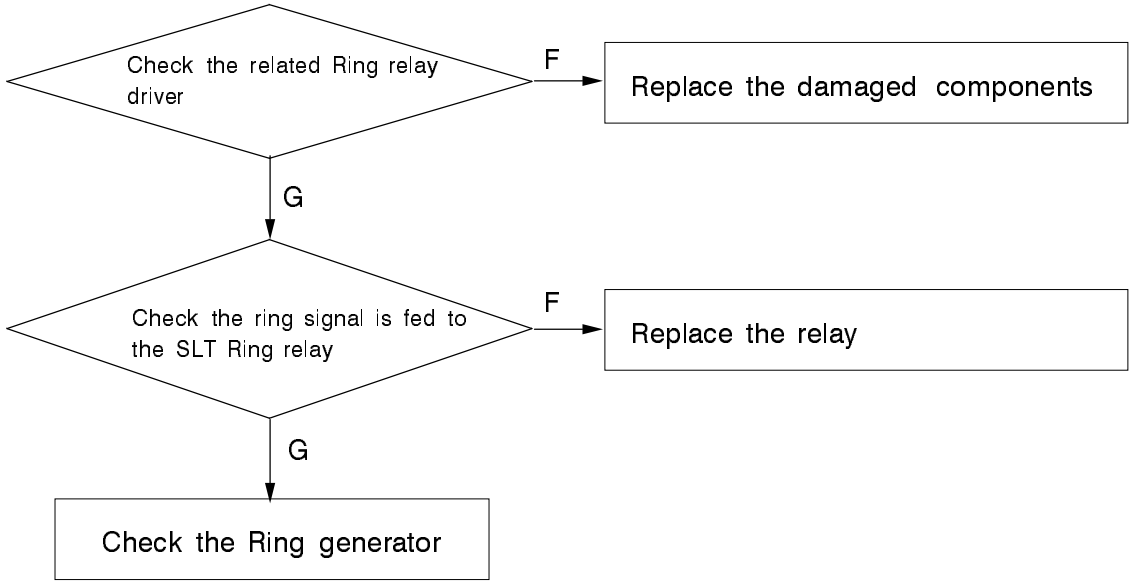

Check the MMC data
F
Adjust the MMC data
G
Check the input terminal of the related read buffer (74HC244)
F
Replace the related hybrid chip(SLC-03) or descrete circuit part
G
Check the chip selection signal of read buffer
F
Check the related decoder and replace it
G
Replace the read buffer(74HC244)

3.3.3 SLT DTMF Detection Failure

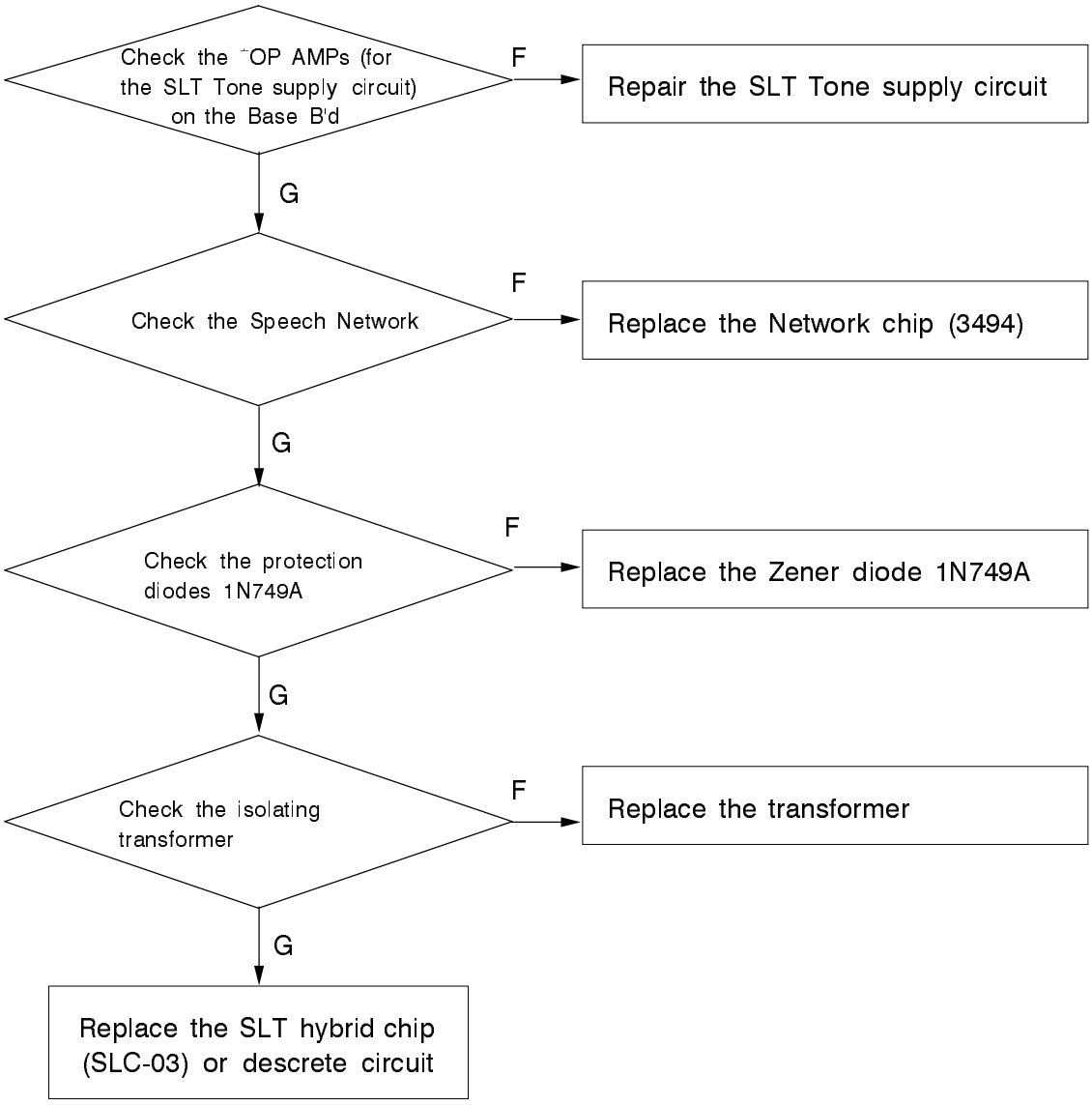


±DTMF Receiver : MT8870 or KA3170

3.3.4 SLT Ring Generation Failure



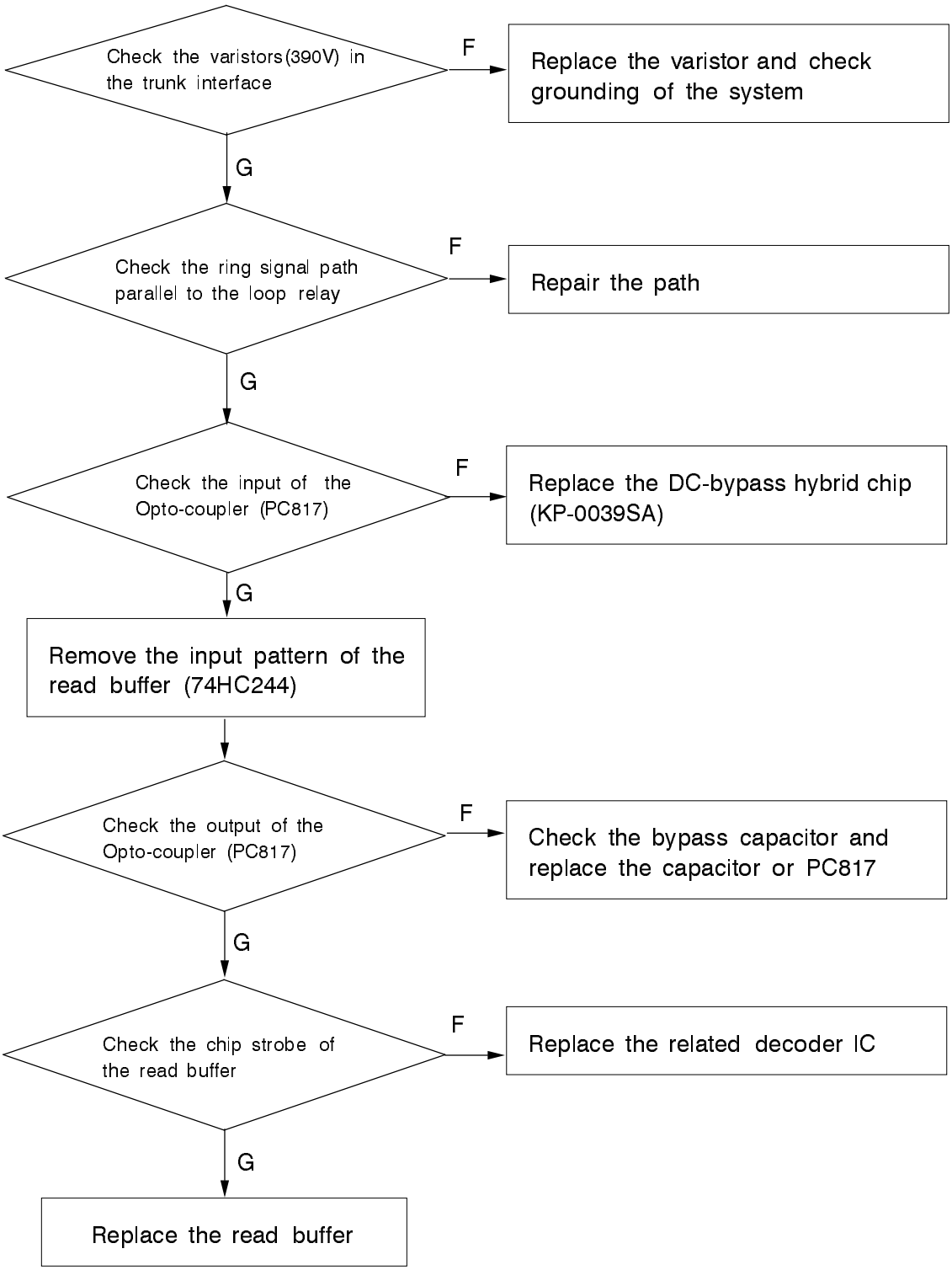
3.3.5 SLT Dial Tone Supply Failure



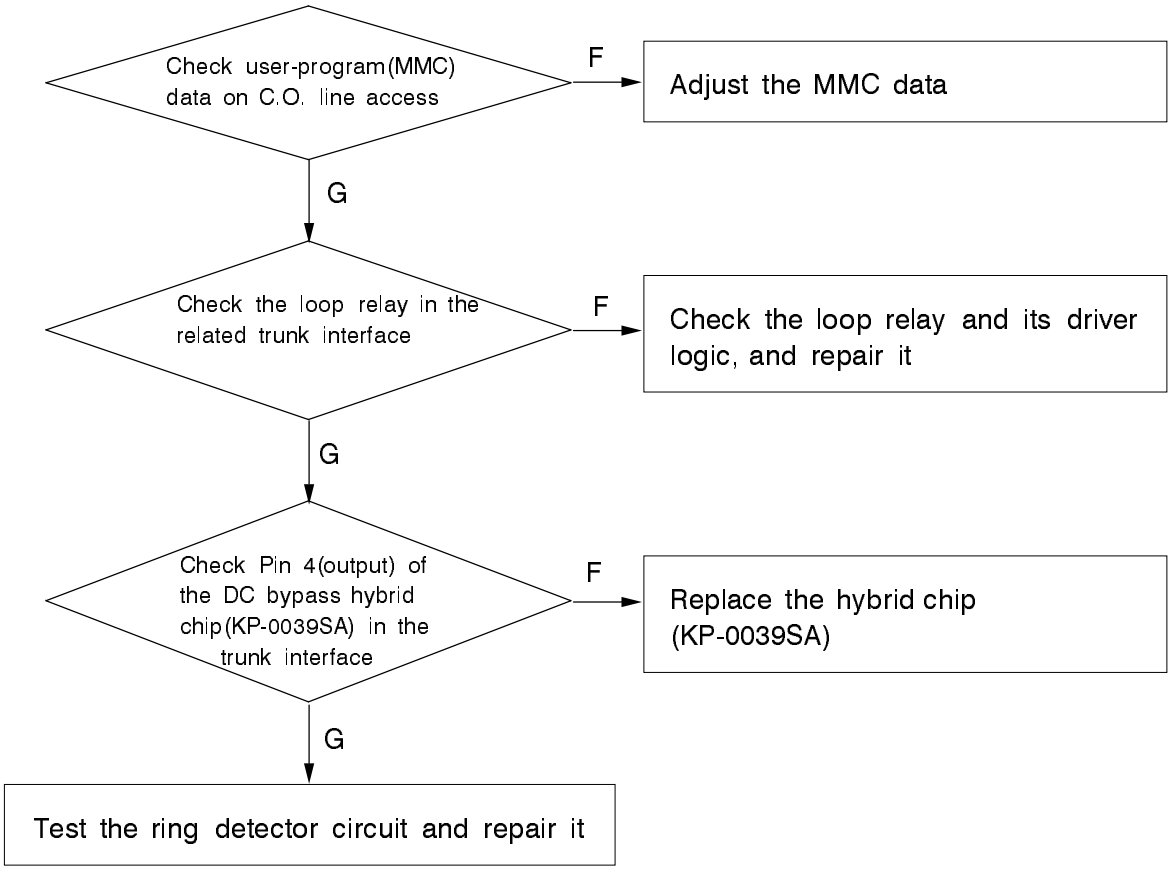
⁻ OP AMP(MC 3403) for the SLT Tone supply

3.4 TRUNK PART

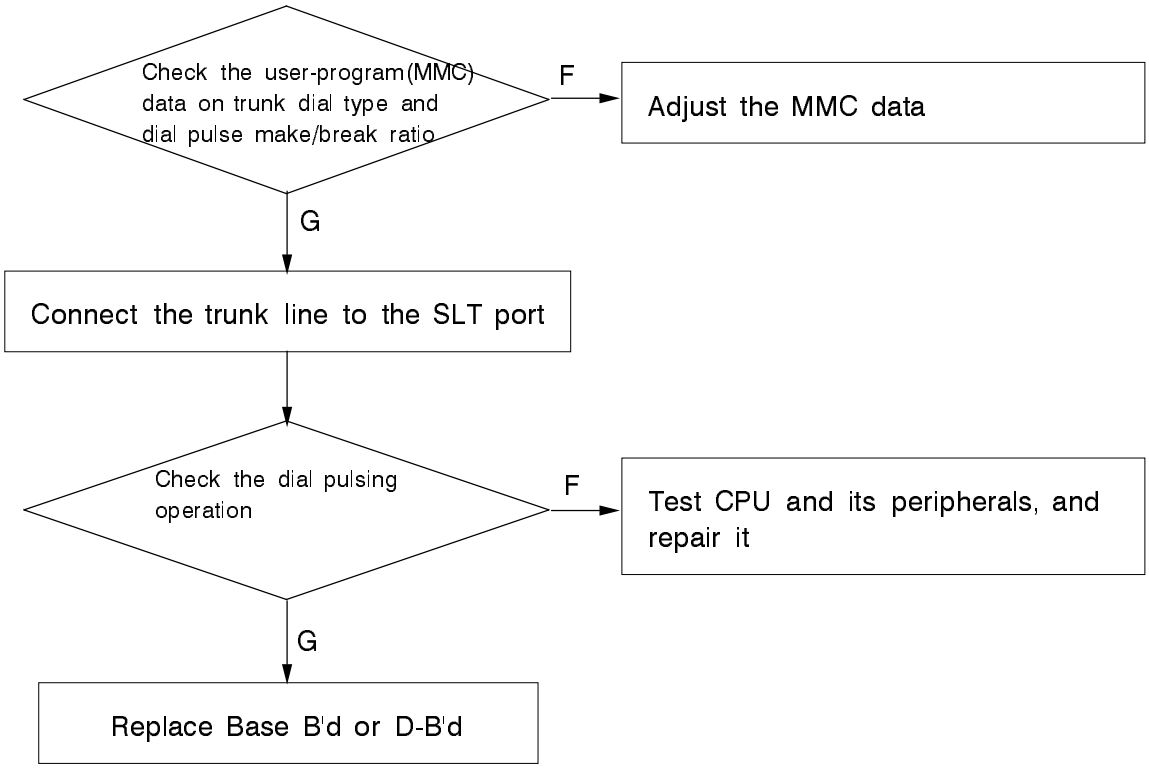
3.4.1 Trunk Ring Detection Failure


Check the varistors(390V) in the trunk interface
F
Replace the varistor and check grounding of the system
G
Check the ring signal path parallel to the loop relay
F
Repair the path
G
Check the input of the Opto-coupler (PC817)
F
Replace the DC-bypass hybrid chip (KP-0039SA)
G
Remove the input pattern of the read buffer (74HC244)
Check the output of the Opto-coupler (PC817)
F
Check the bypass capacitor and replace the capacitor or PC817
G
Check the chip strobe of the read buffer
F
Replace the related decoder IC
G
Replace the read buffer

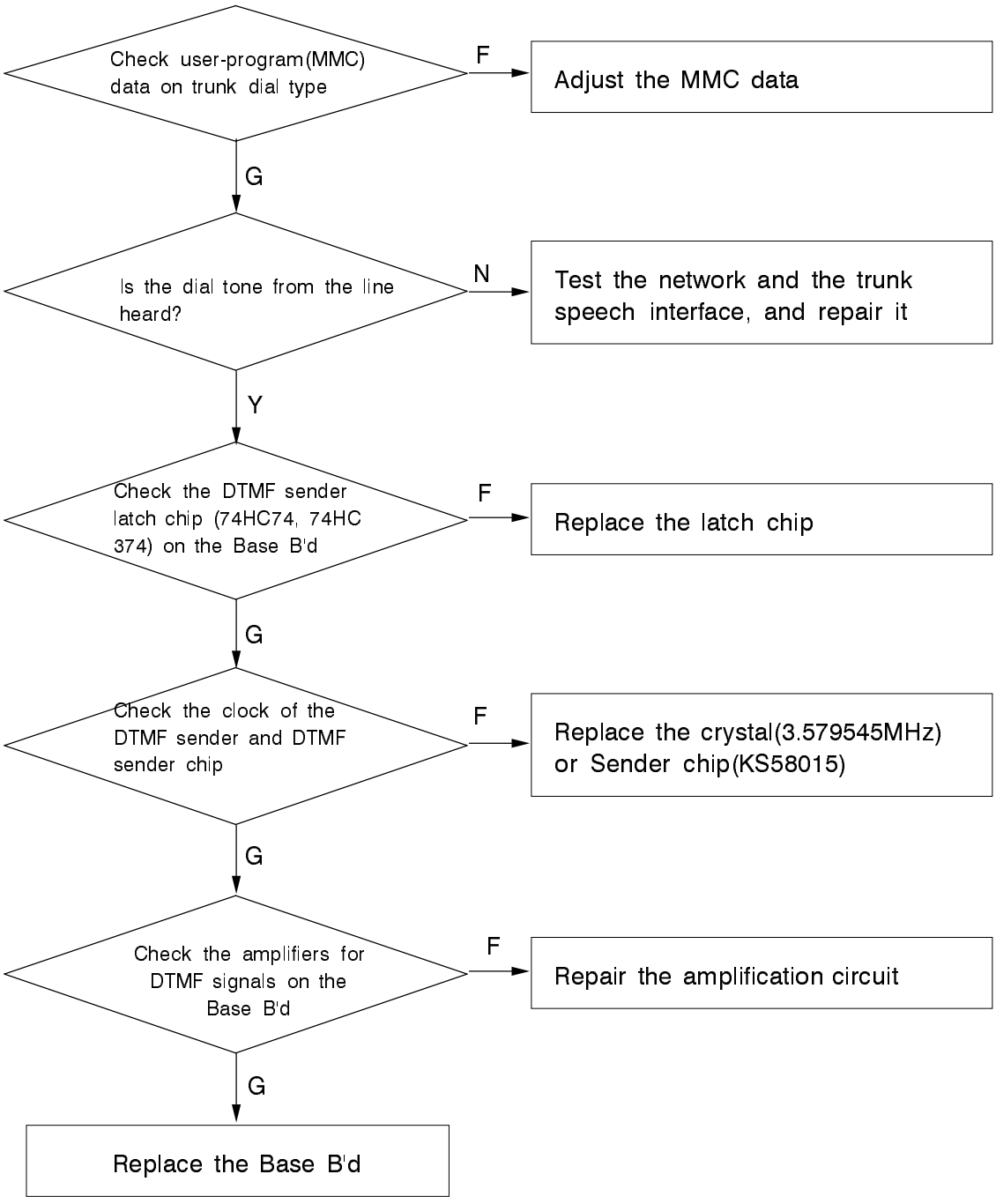
3.4.2 Trunk Access Failure


Check user-program(MMC) data on C.O. line access
F
Adjust the MMC data
G
Check the loop relay in the related trunk interface
F
Check the loop relay and its driver logic, and repair it
G
Check Pin 4(output) of the DC bypass hybrid chip(KP-0039SA) in the trunk interface
F
Replace the hybrid chip (KP-0039SA)
G
Test the ring detector circuit and repair it

3.4.3 Trunk Dial Pulse Sending Failure

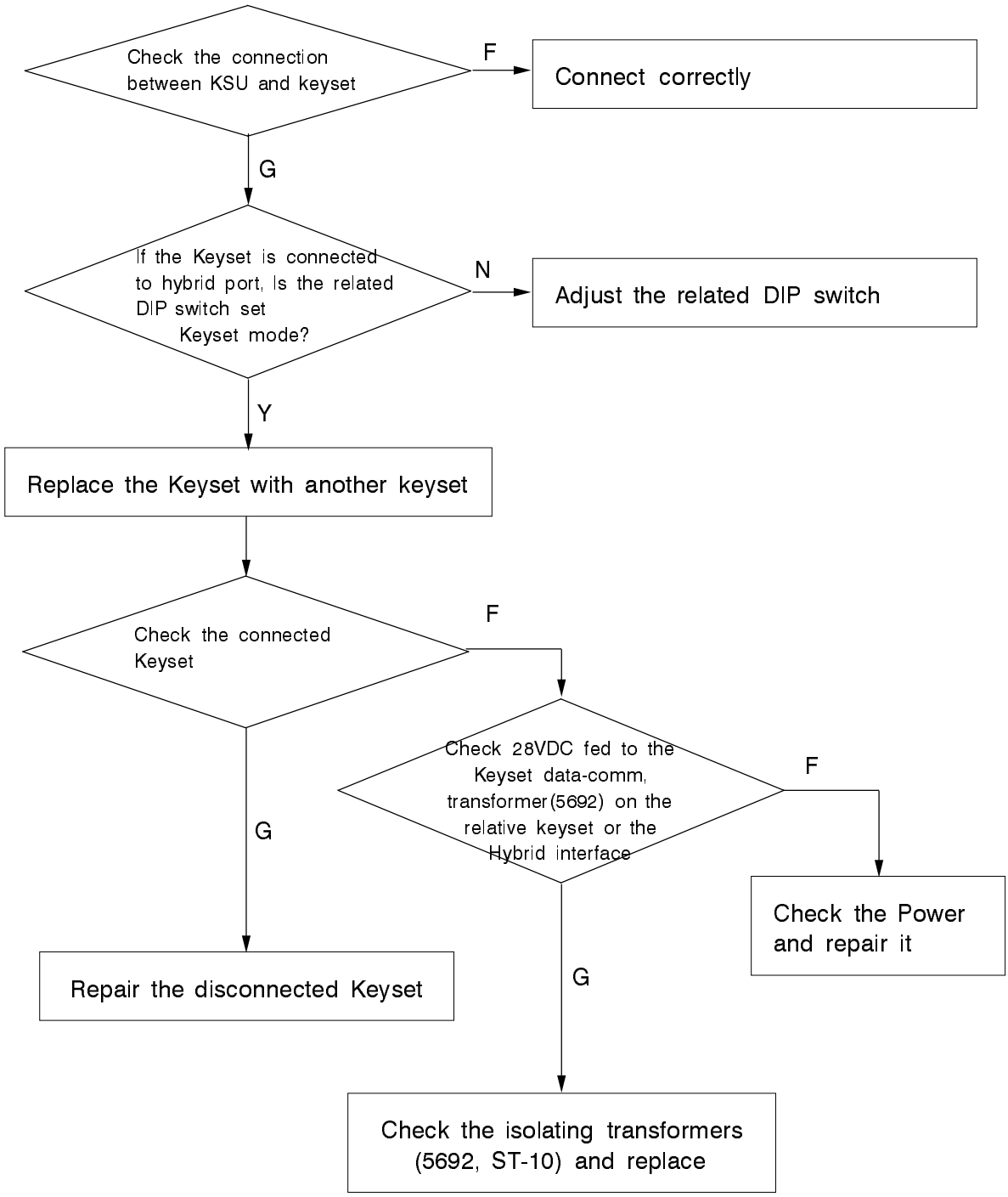

Check the user-program(MMC) data on trunk dial type and dial pulse make/break ratio
F
Adjust the MMC data
G
Connect the trunk line to the SLT port
Check the dial pulsing operation
F
Test CPU and its peripherals, and repair it
G
Replace Base B'd or D-B'd

3.4.4 Trunk DTMF Sending Failure

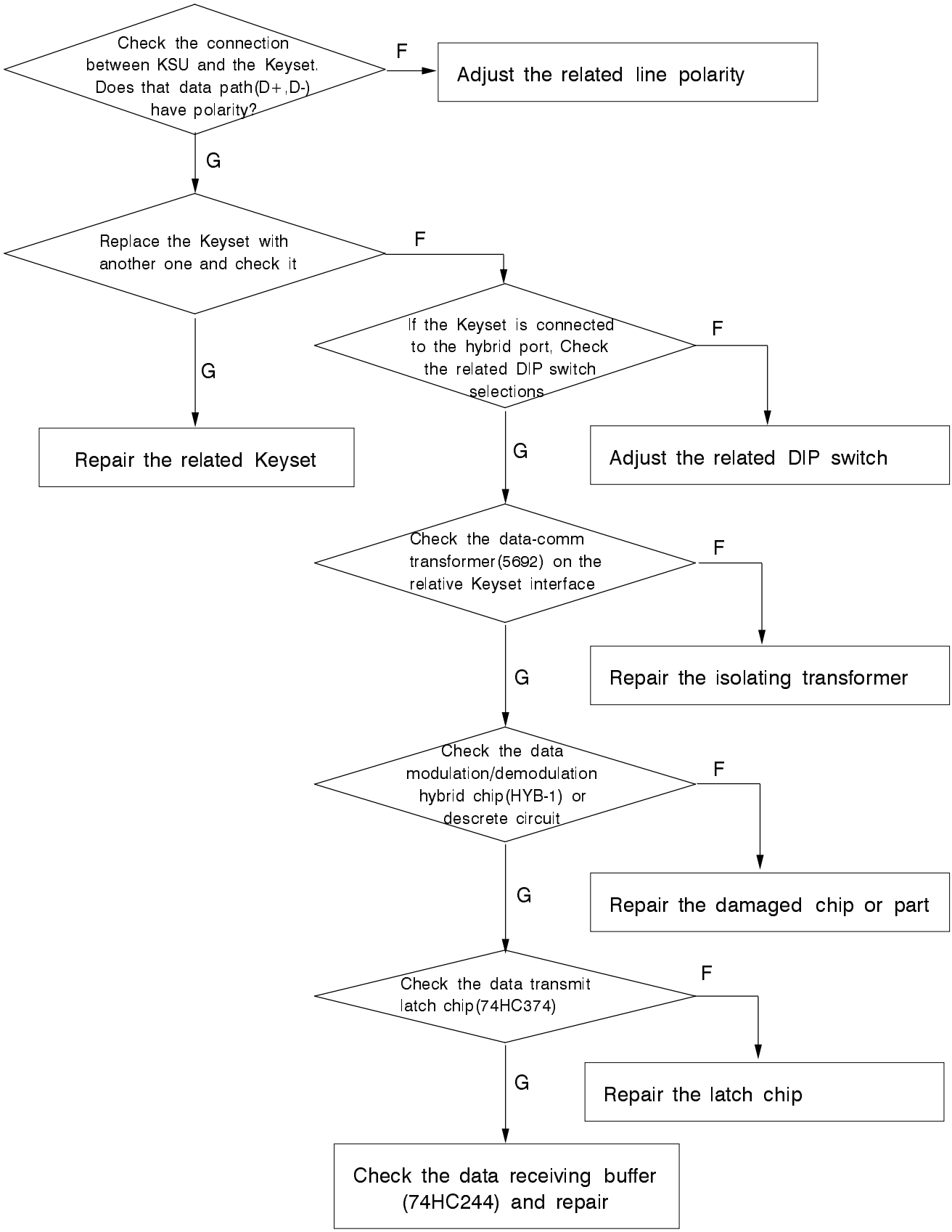

Check user-program(MMC) data on trunk dial type
F
Adjust the MMC data
G
Is the dial tone from the line heard?
N
Test the network and the trunk speech interface, and repair it
Y
Check the DTMF sender latch chip (74HC74, 74HC 374) on the Base B'd
F
Replace the latch chip
G
Check the clock of the DTMF sender and DTMF sender chip
F
Replace the crystal(3.579545MHz) or Sender chip(KS58015)
G
Check the amplifiers for DTMF signals on the Base B'd
F
Repair the amplification circuit
G
Replace the Base B'd

3.5 KEYSET PART

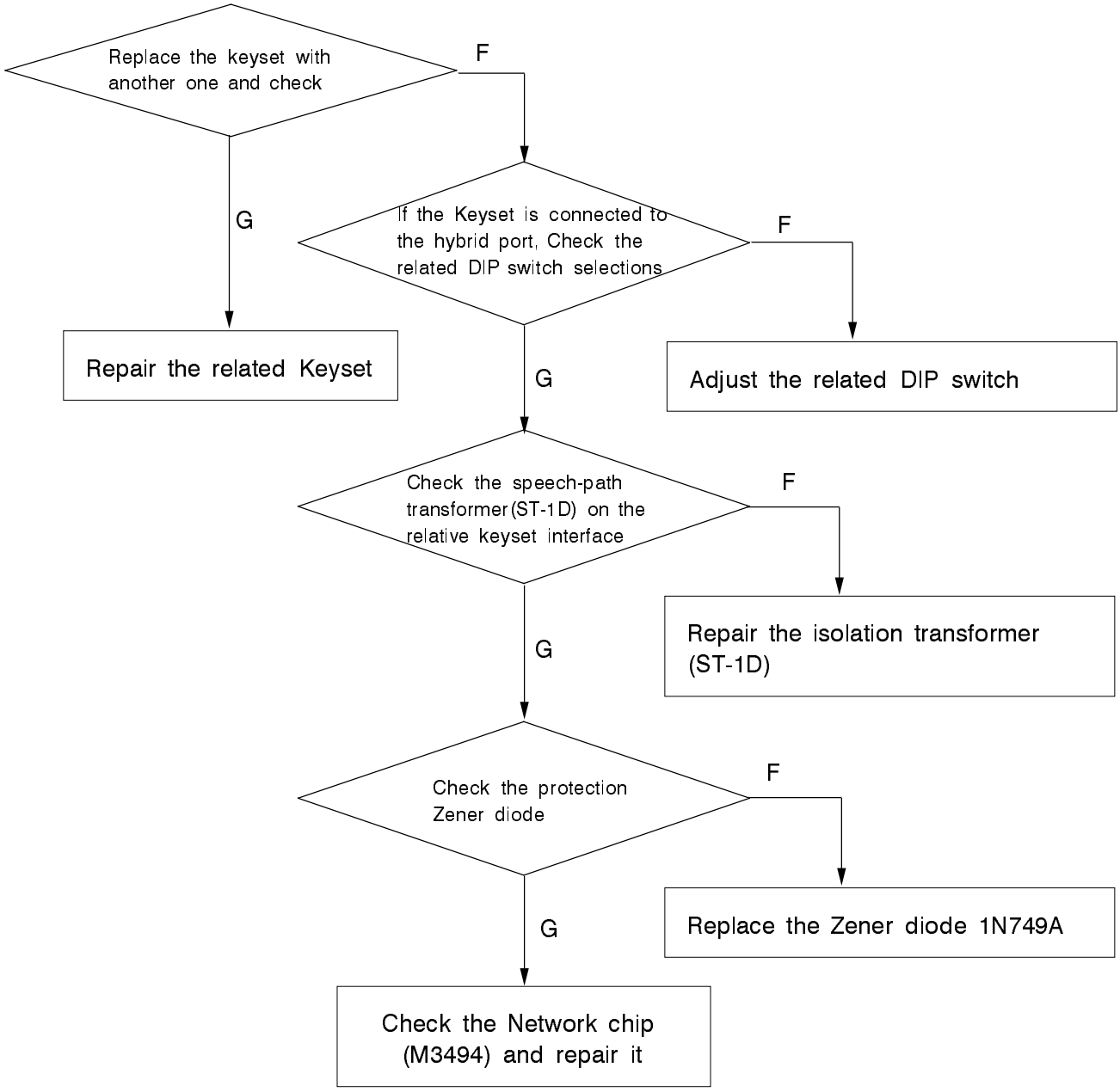
3.5.1 Keyset Power Failure


Check the connection between KSU and keyset
F
Connect correctly
G
If the Keyset is connected to hybrid port, Is the related DIP switch set Keyset mode?
N
Adjust the related DIP switch
Y
Replace the Keyset with another keyset
Check the connected Keyset
F
G
Check 28VDC fed to the Keyset data-comm, transformer(5692) on the relative keyset or the Hybrid interface
F
Check the Power and repair it
G
Repair the disconnected Keyset
Check the isolating transformers (5692, ST-10) and replace

3.5.2 Keyset Data-comm Failure

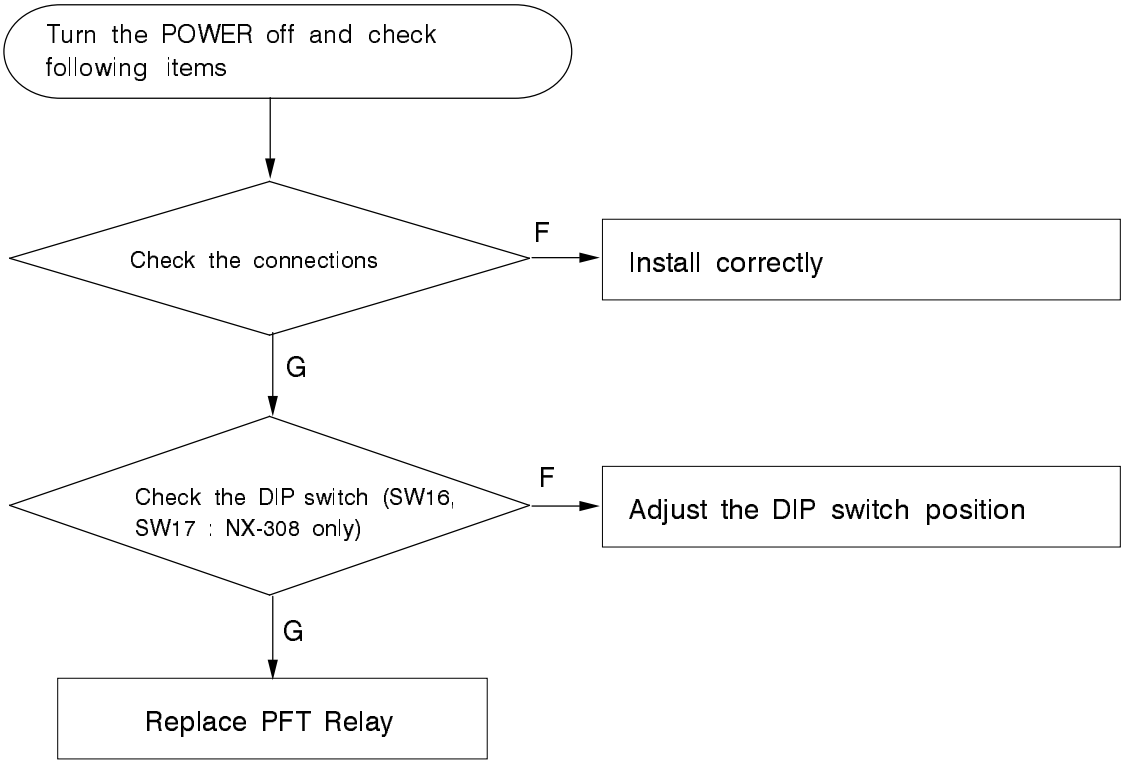

Check the connection between KSU and the Keyset. Does that data path(D+,D-) have polarity?
F
Adjust the related line polarity
G
Replace the Keyset with another one and check it
F
G
If the Keyset is connected to the hybrid port, Check the related DIP switch selections
F
Repair the related Keyset
G
Adjust the related DIP switch
Check the data-comm transformer(5692) on the relative Keyset interface
F
G
Repair the isolating transformer
Check the data modulation/demodulation hybrid chip(HYB-1) or descrete circuit
F
G
Repair the damaged chip or part
Check the data transmit latch chip(74HC374)
F
G
Repair the latch chip
Check the data receiving buffer (74HC244) and repair

3.5.3 Keyset Speech Failure

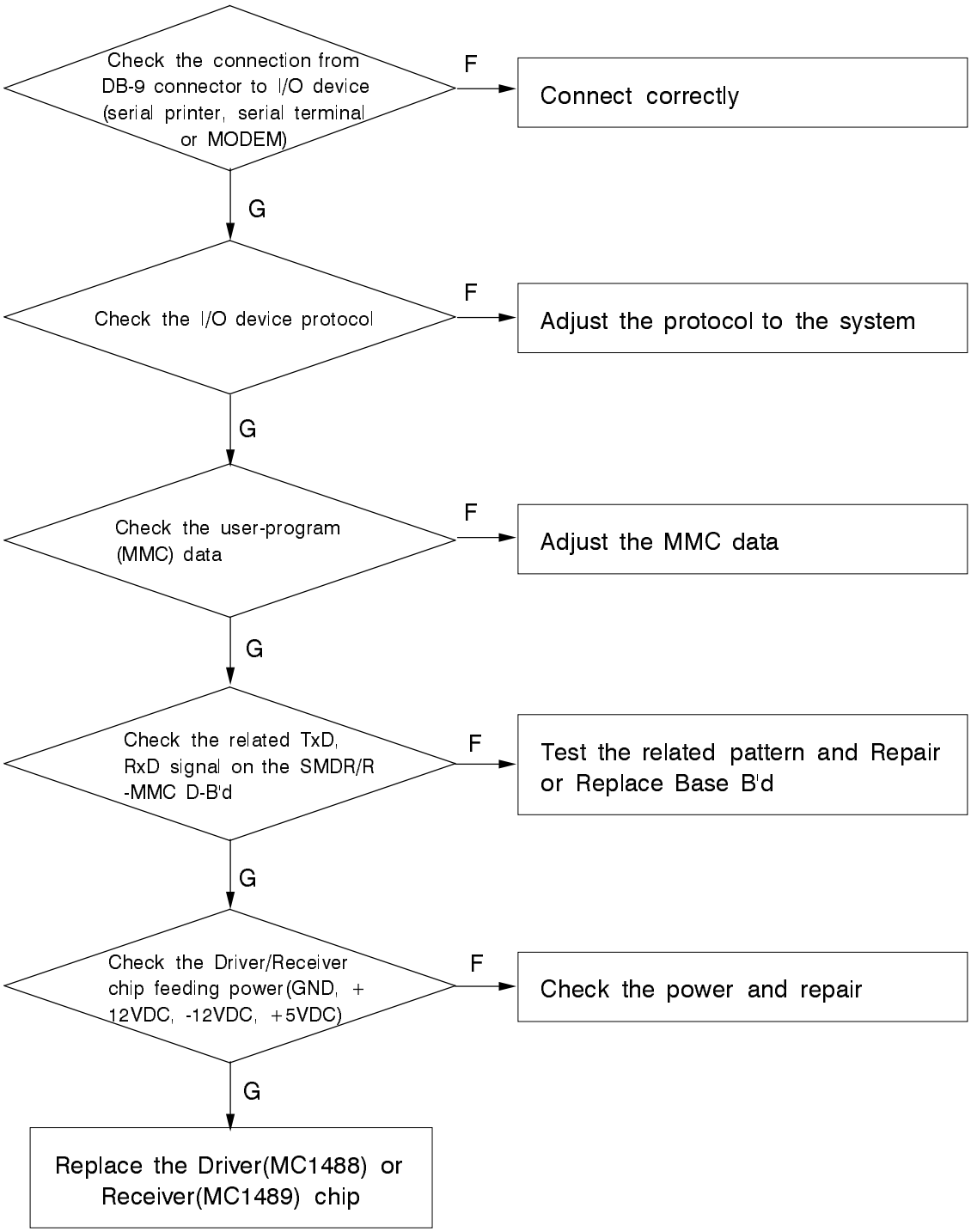

Replace the keyset with another one and check
F
G
If the Keyset is connected to the hybrid port, Check the related DIP switch selections
F
G
Repair the related Keyset
Adjust the related DIP switch
Check the speech-path transformer(ST-1D) on the relative keyset interface
F
G
Repair the isolation transformer (ST-1D)
Check the protection Zener diode
F
G
Replace the Zener diode 1N749A
Check the Network chip (M3494) and repair it

3.6 OTHERS

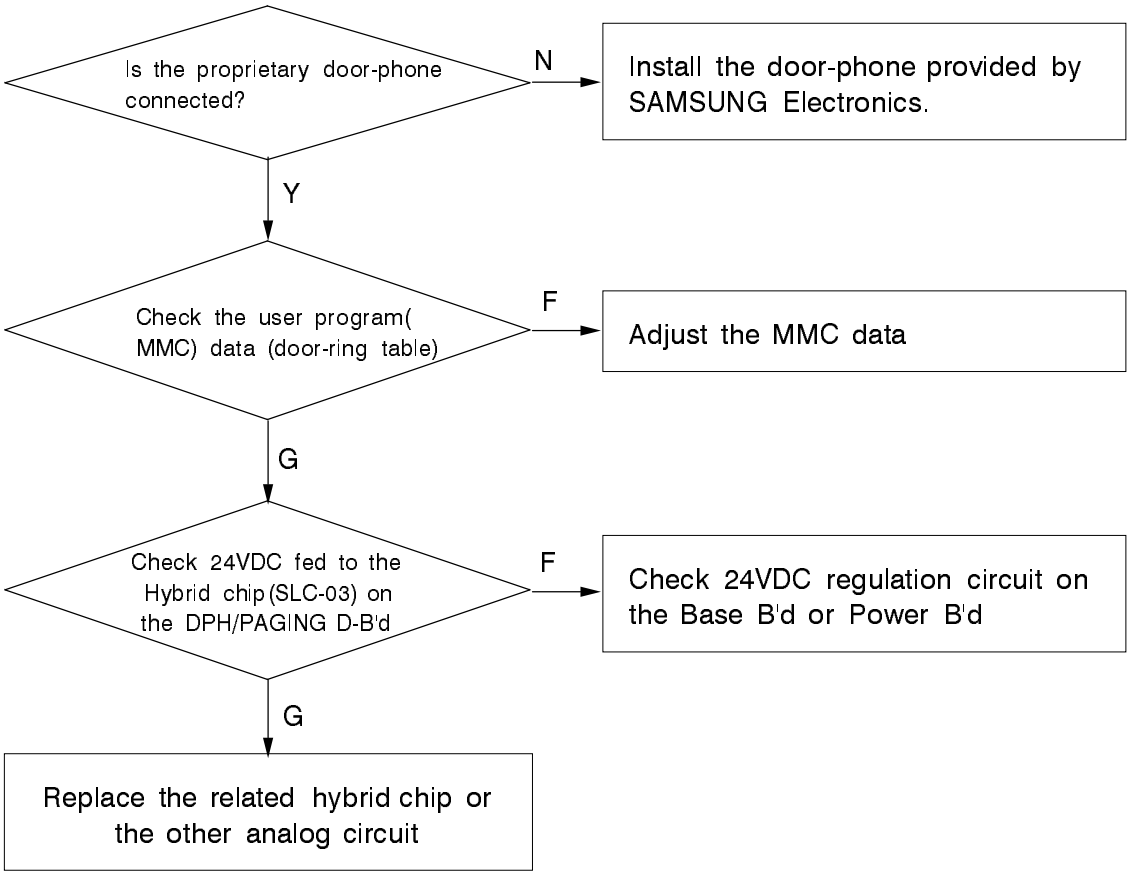
3.6.1 Power Fail Transfer(PFT) Failure



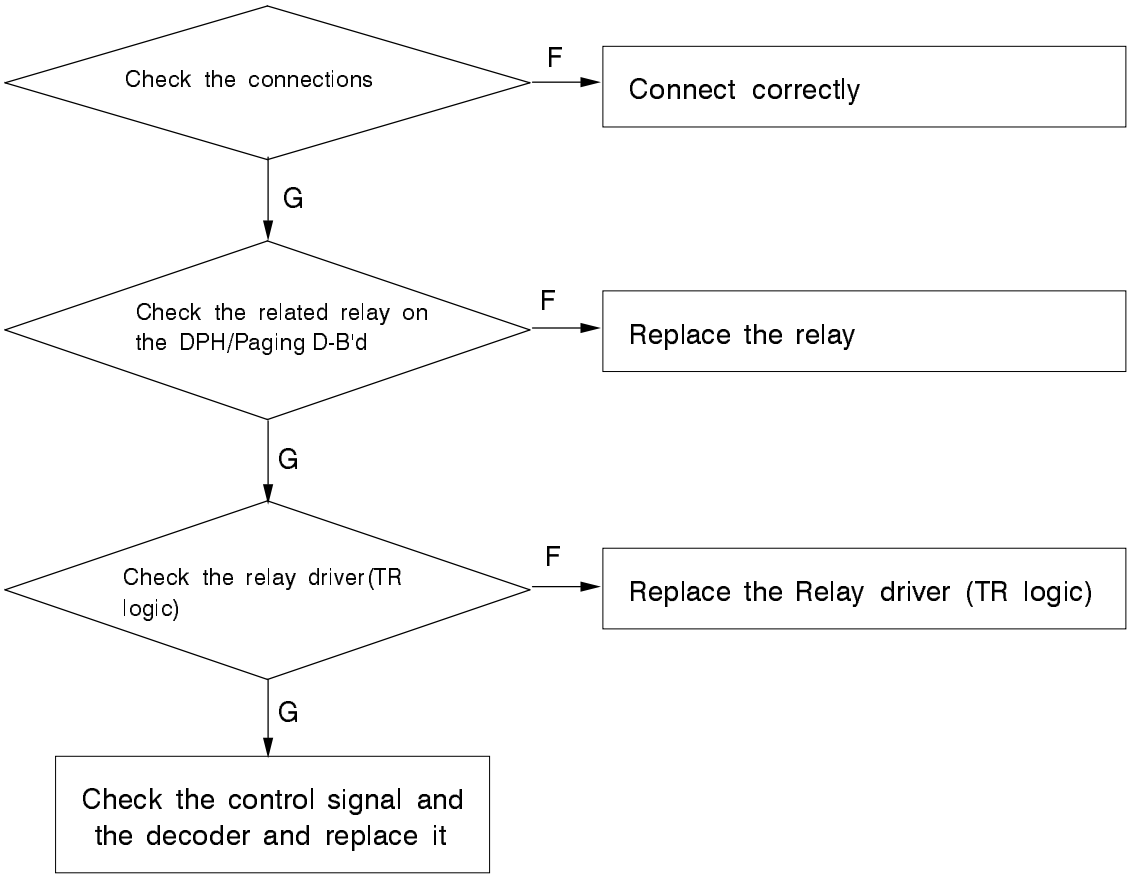
3.6.2 SMDR/R-MMC Failure


Check the connection from DB-9 connector to I/O device (serial printer, serial terminal or MODEM)
F
Connect correctly
G
Check the I/O device protocol
F
Adjust the protocol to the system
G
Check the user-program (MMC) data
F
Adjust the MMC data
G
Check the related TxD, RxD signal on the SMDR/R -MMC D-B'd
F
Test the related pattern and Repair or Replace Base B'd
G
Check the Driver/Receiver chip feeding power(GND, +12VDC, -12VDC, +5VDC)
F
Check the power and repair
G
Replace the Driver(MC1488) or Receiver(MC1489) chip

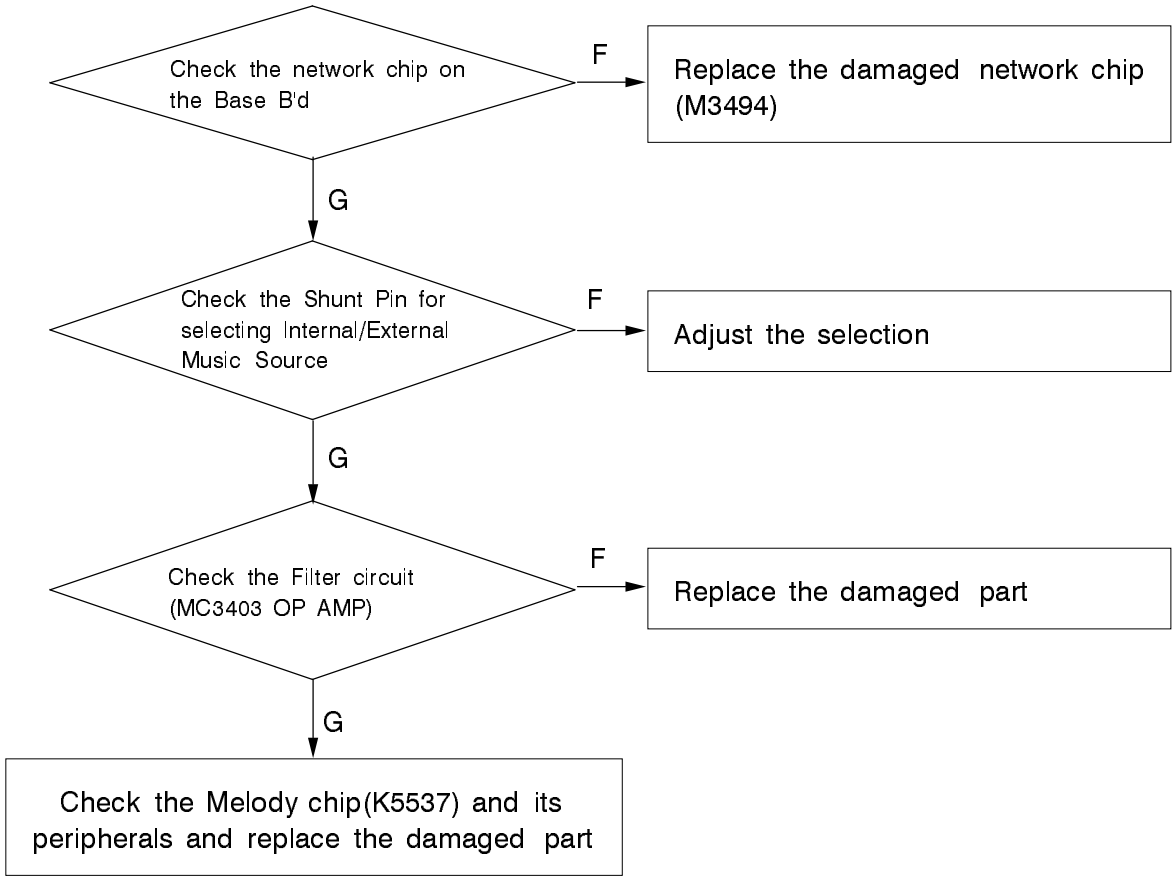
3.6.3 Door-phone Failure


Is the proprietary door-phone connected?
N
Install the door-phone provided by SAMSUNG Electronics.
Y
Check the user program(MMC) data (door-ring table)
F
Adjust the MMC data
G
Check 24VDC fed to the Hybrid chip(SLC-03) on the DPH/PAGING D-B'd
F
Check 24VDC regulation circuit on the Base B'd or Power B'd
G
Replace the related hybrid chip or the other analog circuit

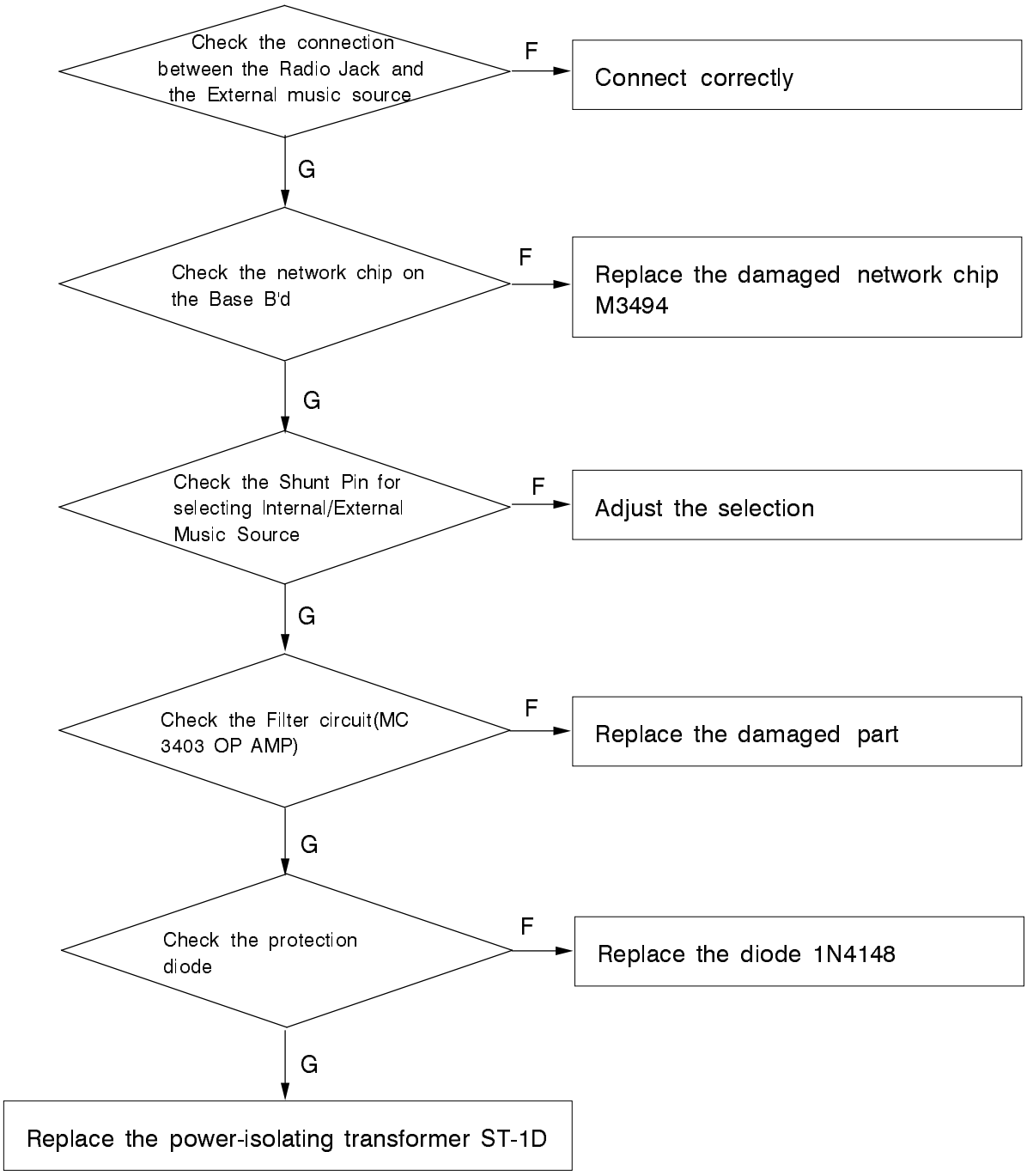
3.6.4 Door Lock Failure



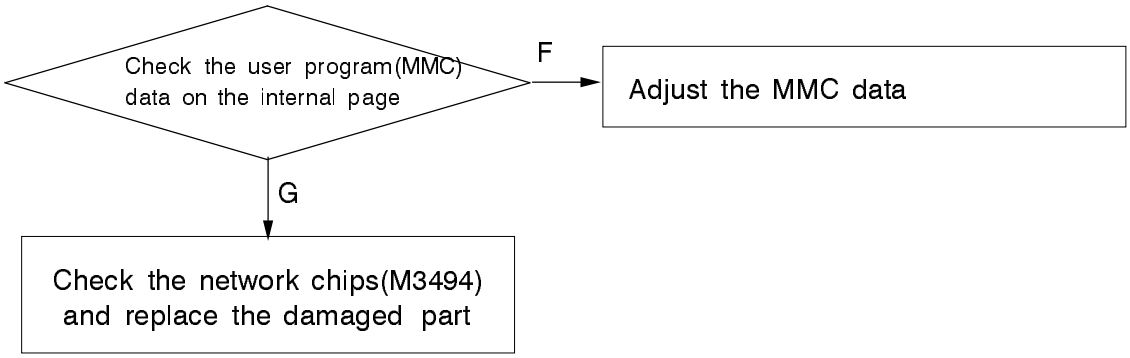
3.6.5 Internal Music Source Failure


Check the network chip on the Base B'd
F
Replace the damaged network chip (M3494)
G
Check the Shunt Pin for selecting Internal/External Music Source
F
Adjust the selection
G
Check the Filter circuit (MC3403 OP AMP)
F
Replace the damaged part
G
Check the Melody chip(K5537) and its peripherals and replace the damaged part

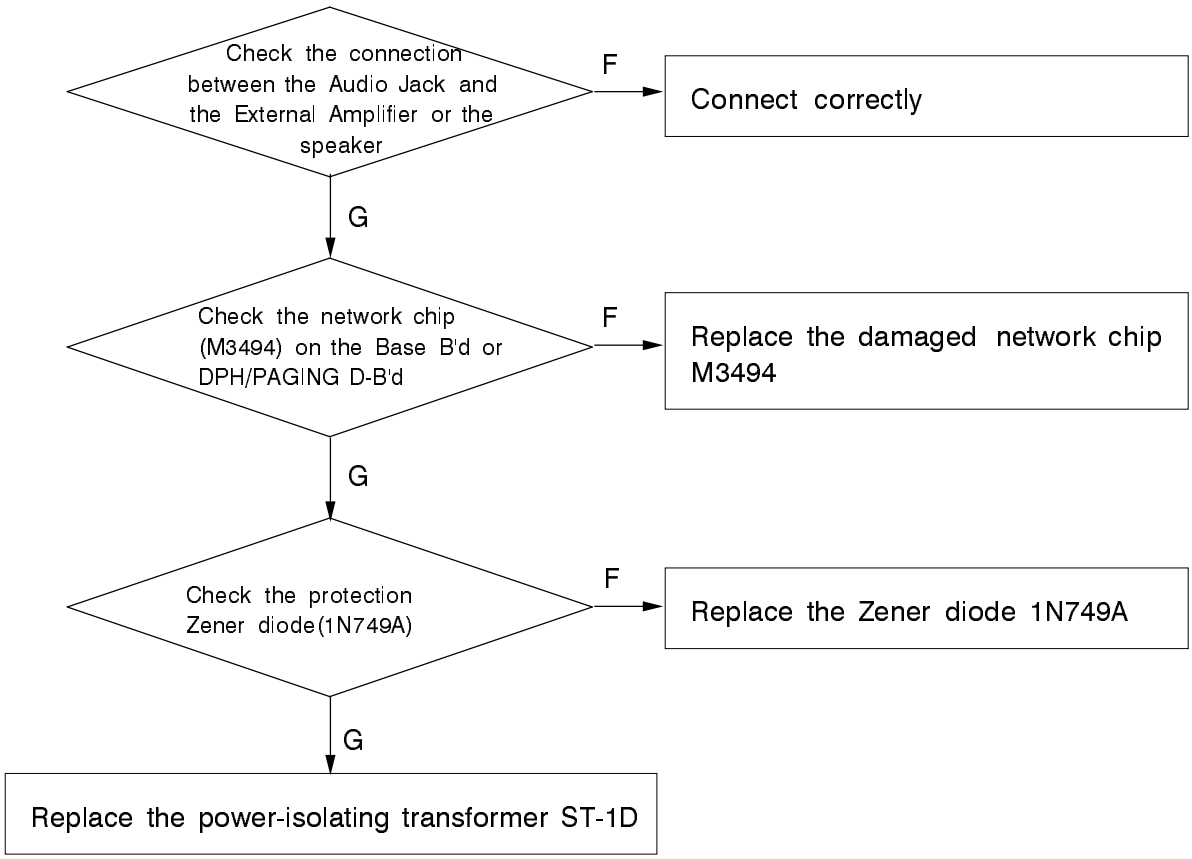
3.6.6 External Music Source Failure



3.6.7 Internal Page Failure


Check the user program(MMC) data on the internal page
F
Adjust the MMC data
G
Check the network chips(M3494) and replace the damaged part

3.6.8 External Page Failure


Check the connection between the Audio Jack and the External Amplifier or the speaker
F
Connect correctly
G
Check the network chip (M3494) on the Base B'd or DPH/PAGING D-B'd
F
Replace the damaged network chip M3494
G
Check the protection Zener diode(1N749A)
F
Replace the Zener diode 1N749A
G
Replace the power-isolating transformer ST-1D

6.EXPLODED VIEW & PARTS LIST

6-1 NX-308 SYSTEM

6.1.1 Exploded View

6.1.2 Parts List

6-2 NX-820/1232 SYSTEM

6.2.1 Exploded View

6.2.2 Parts List

6-3 NX-24E KEYSET

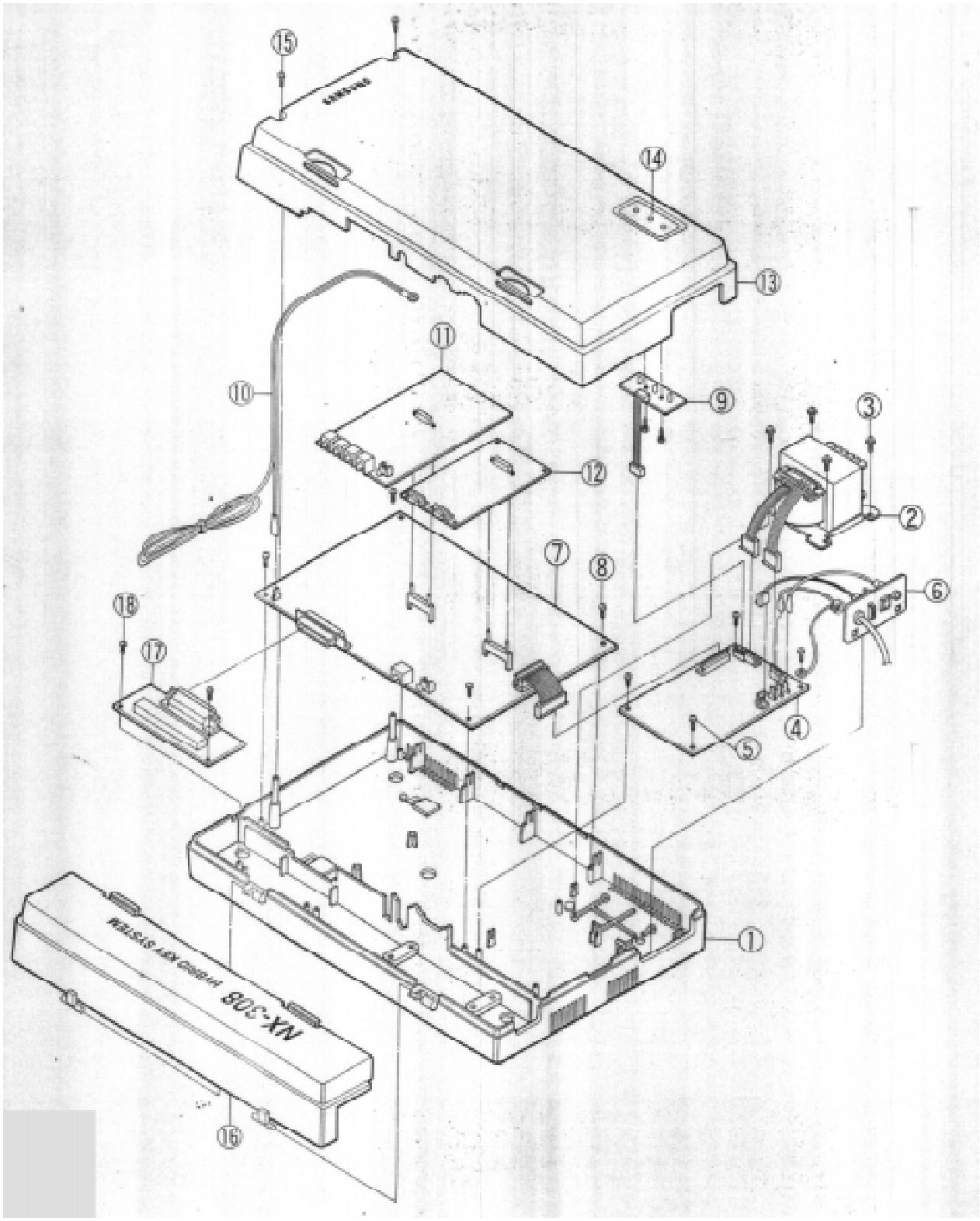
6.3.1 Exploded View

6.3.2 Parts List

6. EXPLODED VIEW & PARTS LIST

6.1 NX-308 SYSTEM

6.1.1 EXPLODED VIEW

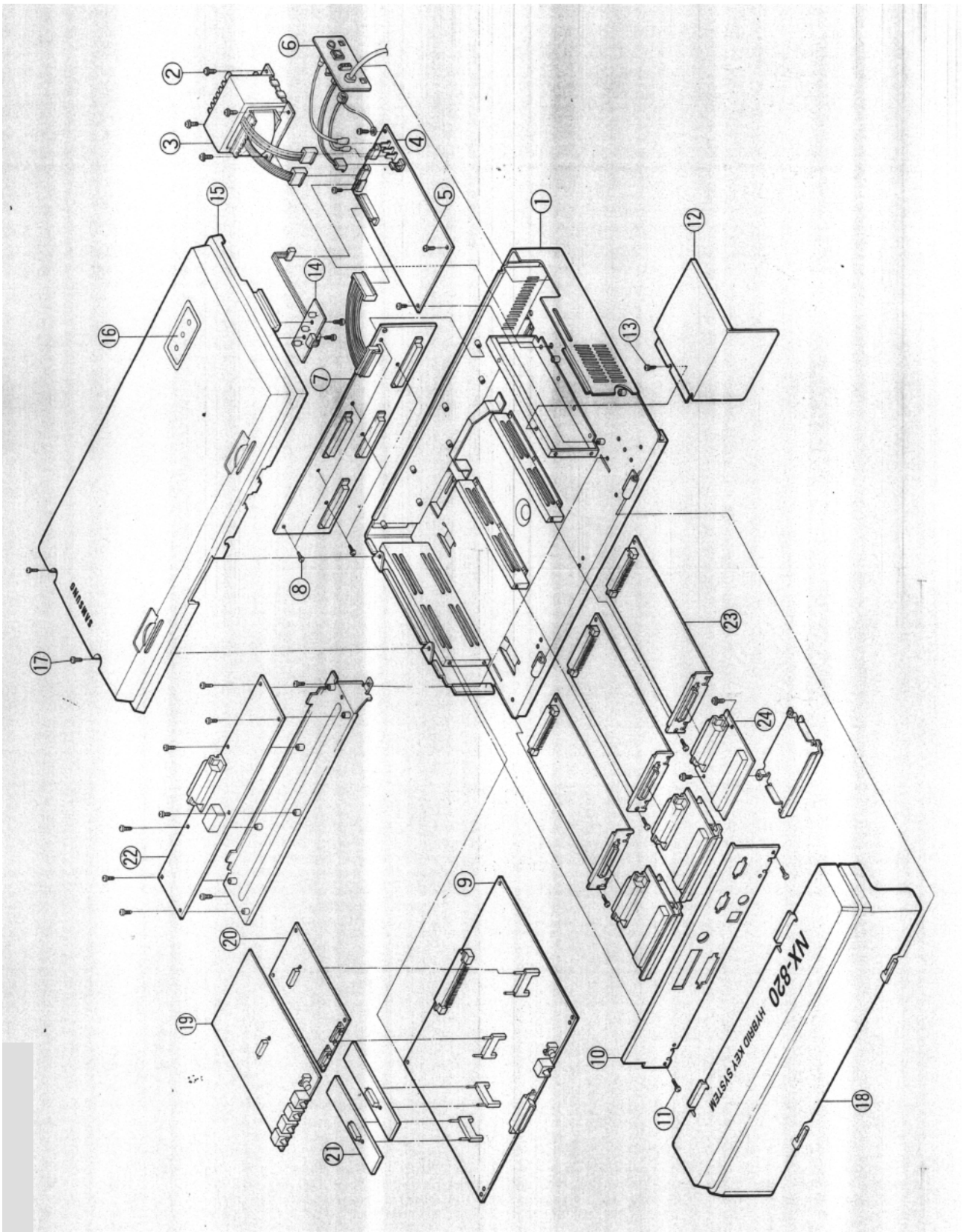


6.1.2 PARTS LIST

NUMBER	SEC CODE	DESCRIPTION
①	GA72-40799A	BASE PLATE
②	EC26-30071A	TRANS
③	6002-000328	TAPPING, M4,L8
④	GA92-01113A	POWER B'D
⑤, ⑧, ⑱	6002-000147	TAPPING, M3, L10
⑥	GA70-10649A	BRKT-POWER
⑦	GA92-01111A	BASE B'D
⑨	GA92-01119A	LED B'D
⑩	GA39-40002A	CABLE
⑪	GA92-01115A(00069A)	D/P B'D (W VMS)
⑫	GA92-01117A	SMDR B'D
⑬	GA72-40798A	TOP HOUSING
⑭	GA72-10570A	LED COVER
⑮	6006-000130	MACHING,A,M3,L8
⑯	GA72-40800A	SIDE COVER
⑰	GA92-01151A(01152A)	MDFA-CLIP (-MODULAR)

6.2 NX-820 SYSTEM

6.2.1 EXPLODED VIEW

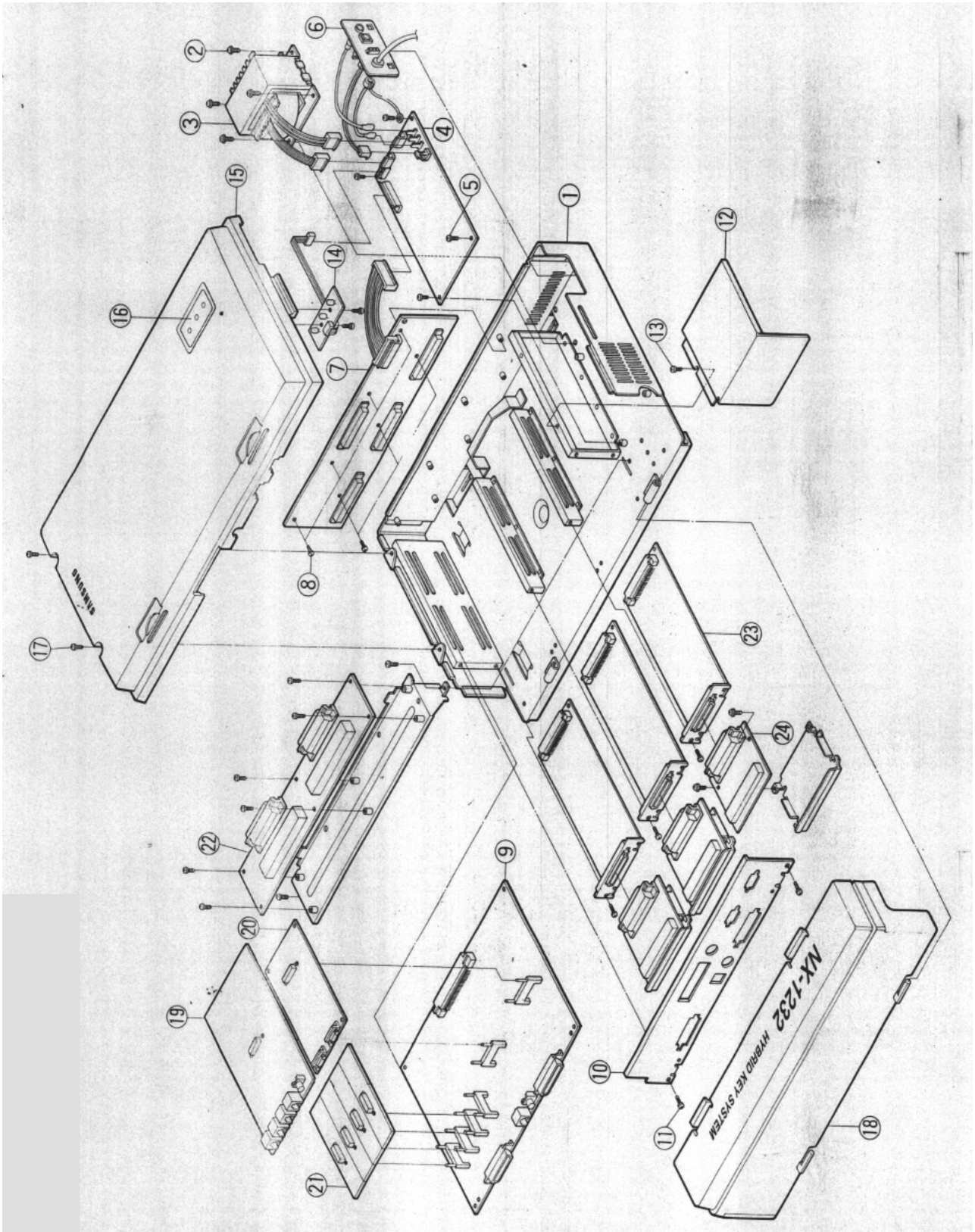


6.2.2 PARTS LIST

NUMBER	SEC CODE	DESCRIPTION
①	GA75-10577A	MAIN PLATE ASS'Y
②	6006-000200	TAPTITE,M4,L8
③	GA26-30071A	TRANS
④	GA92-01123A	POWER B'D
⑤,⑧,⑪,⑬	6006-000130	MACHINE,M3,L8
⑥	GA70-10649A	BRKT-POWER
⑦	GA92-01125A	CONNECTION B'D
⑨	GA92-01121A	BASE B'D
⑩	GA70-10689A	STIFFENER-PBA A
⑫	GA70-10692A	POWER COVER
⑭	GA92-01119A	LED B'D
⑮	GA72-40795A	TOP HOUSING
⑯	GA72-10570A	LED COVER
⑰	6001-000575	MACHINE,M4,L10
⑱	GA72-40796A	SIDE COVER
⑲	GA92-01115A(00069A)	D/P B'D (W VMS)
⑳	GA92-01117A	SMDR B'D
㉑	GA92-01131A(01129A)/01127A	MPD-12KHz(16KHz) / PRS B'D
㉒	GA92-01155A(01156A)	MDFB-CLIP (-MODULAR)
㉓	GA92-01135A~01141A	OPTION B'D
㉔	GA92-01161A(01162A)	MDFD-CLIP (-MODULAR)

6.3 NX-1232 SYSTEM

6.3.1 EXPLODED VIEW



6.3.2 PARTS LIST

NUMBER	SEC CODE	DESCRIPTION
①	GA75-10577A	MAIN PLATE ASS'Y
②	6006-000200	TAPTITE,M4,L8
③	GA26-30071A	TRANS
④	GA92-01123A	POWER B'D
⑤,⑧,⑪,⑬	6006-000130	MACHINE,M3,L8
⑥	GA70-10649A	BRKT-POWER
⑦	GA92-01125A	CONNECTION B'D
⑨	GA92-01143A	BASE B'D
⑩	GA70-10690A	STIFFENER-PBA A
⑫	GA70-10692A	POWER COVER
⑭	GA92-01119A	LED B'D
⑮	GA72-40795A	TOP HOUSING
⑯	GA72-10570A	LED COVER
⑰	6001-000575	MACHINE,M4,L10
⑱	GA72-40797A	SIDE COVER
⑲	GA92-01115A(00069A)	D/P B'D (W VMS)
⑳	GA92-01117A	SMDR B'D
㉑	GA92-01131A(01129A)/01127A	MPD-12KHz(16KHz) / PRS B'D
㉒	GA92-01159A(01160A)	MDFC-CLIP (-MODULAR)
㉓	GA92-01135A~01147A	OPTION B'D
㉔	GA92-01161A(01162A)	MDFD-CLIP (-MODULAR)

5.PARTS LIST

5.1 NX-308 BASE B'D .....5 - 1
5.2 NX-820 BASE B'D .....5 - 6
5.3 NX-1232 BASE B'D 5-11
5.4 NX-308 POWER B'D 5-16
5.5 NX-820/1232 POWER B'D 5-19
5.6 NX-4SLI EXP B'D 5-22
5.7 NX-4KLI EXP B'D 5-24
5.8 NX-2TRK B'D 5-25
5.9 NX-4TRK B'D 5-27
5.10 NX-4OPX B'D 5-29
5.11 NX-8SLI EXP B'D 5-31
5.12 NX-8KLI EXP B'D 5-33
5.13 NX-DOORPHONE/PAGING D-B'D 5-34
5.14 NX-SMDR / R-MMC B'D 5-36
5.15 NX-MPD D-B'D
5.15.1. 12KHz 5-37
5.15.2. 16KHz 5-37
5.16NX-PRS D-B'D 5-38

5. PARTS LIST

5.1 NX-308 BASE B'D

※ FFR : Forcasting Failure Rate per system

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01111A	PBA:NEW ANALOG K/P,-,-,-,	1		
0401-000140	DIODE-SWITCHING:1N4148,10	6	D78-79,D81-82,D84-85	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	12	D2-6,D10-11,D13-17	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	9	D21-22,D24-28,D32-33	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	12	D35-39,D43-44,D46-50	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	9	D54-55,D57-61,D65-66	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	2	D91-92	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	7	D68-72,D76-77	0.001
0402-000165	DIODE-RECTIFIER:1N5819,40	2	D87-88	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	8	D1,D7-9,D12,D18-20	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	5	D23,D29-31,D34,	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	7	D40-42,D45,D51-53	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	7	D56,D62-64,D73-75	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	5	D80,D83,D86,D90,D67	0.001
0403-000161	DIODE-ZENER:1N4751A,30V,5	6	ZD1-2,ZD5-6,ZD9-10	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	26	ZD3-4,ZD7-8,ZD11-32	0.001
0501-000295	TR-SMALL SIGNAL:KSA709,PN	6	Q2,Q5,Q8,Q11,Q14,Q17	0.002
0501-000295	TR-SMALL SIGNAL:KSA709,PN	1	Q20	0.002
0501-000332	TR-SMALL SIGNAL:KSC1009,N	7	Q1,Q3-4,Q6-7,Q9-10	0.002
0501-000332	TR-SMALL SIGNAL:KSC1009,N	6	Q12-13,Q15-16,Q18-19	0.002
0501-000332	TR-SMALL SIGNAL:KSC1009,N	12	Q21-32	0.002
0801-000412	IC-CMOS LOGIC:74HC32,OR G	1	U14	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	4	U15-17,U20	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	4	U7,U10-11,U24	0.002
0801-000708	IC-CMOS LOGIC:74HC373,D L	1	U8	0.001
0801-000711	IC-CMOS LOGIC:74HC244,BUF	3	U12-13,U23	0.001
0801-000722	IC-CMOS LOGIC:74HC245,TRA	1	U9	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U19	0.001
0801-000913	IC-CMOS LOGIC:74HC74,D FL	2	U18,U21	0.001
0902-000223	IC-MICROPROCESSOR:64180,8	1	U1	0.001

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
0909-000102	IC-REAL TIME CLOCK:6242,4	1	U6	0.001
1106-000371	IC-SRAM:62256,32KX8BIT,DI	1	U4	0.001
1201-000250	IC-OP AMP:3403,DIP,14P,30	5	U25-28,U30	0.002
1202-000138	IC-VOLTAGE COMP.:1232,DIP	1	U22	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U39	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	2	U2-3	0.005
1205-000468	IC-DTMF GENERATOR:KS58015	1	U29	0.002
1205-000469	IC-DTMF RECEIVER:MT8870,D	3	U31-33	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-,	8	P1-8	0.002
1405-000130	VARISTOR:270V,1200A,9x4.6	7	V8-14	0.003
1405-000137	VARISTOR:33V,250A,14x8.5m	7	V1-7	0.003
1405-000141	VARISTOR:390V,1200A,9x5.4	9	V15-23	0.003
2001-000216	R-CARBON:1.2Kohm,2%,1/4W,	4	R94-95,R98,R185	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	4	R124,R127,R129,R132	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	4	R138,R140,R142,R144	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	4	R168,R193-194,R197	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	3	R198,R200-201	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	4	R72,R76,R80,R159	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	1	R176	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	4	R87-88,R89,R123	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	6	R3,R7-8,R13,R17-18	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R23,R27-28,R33,R37	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R38,R43,R47-48,R53	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R57-58,R63,R67-68	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R73,R77,R81,R83,R86	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	6	R126,R134-137,R146	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	2	R147,R203	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	3	R169-170,R208	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R196	
2001-000315	R-CARBON:120Kohm,2%,1/4W,	2	R181-182	
2001-000327	R-CARBON:12Kohm,2%,1/4W,A	3	R71,R75,R79	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	3	R209,R84-85	
2001-000393	R-CARBON:180Kohm,2%,1/4W,	3	R100,R102,R192	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	6	R1-2,R11-12,R21-22	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	6	R31-32,R41-42,R51-52	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	5	R61-62,R204-206	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	4	R74,R78,R82,R93	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	3	R96-97,R186	
2001-000467	R-CARBON:2.7Kohm,2%,1/4W,	2	R179-180	
2001-000532	R-CARBON:240ohm,2%,1/4W,A	1	R184	
2001-000543	R-CARBON:270Kohm,2%,1/4W,	2	R172-173	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	5	R4,R6,R14,R16,R24	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	5	R26,R34,R36,R44,R46	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	5	R54,R56,R64,R66,R167	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	1	R178	
2001-000573	R-CARBON:2Kohm,2%,1/4W,AA	5	R121-122,R150-152	
2001-000573	R-CARBON:2Kohm,2%,1/4W,AA	3	R154,R174-R175	
2001-000585	R-CARBON:3.3Kohm,2%,1/4W,	8	R109-116	
2001-000620	R-CARBON:300Kohm,2%,1/4W,	1	R92	
2001-000648	R-CARBON:330ohm,2%,1/4W,A	1	R202	
2001-000654	R-CARBON:33Kohm,2%,1/4W,A	2	R161,R164	
2001-000675	R-CARBON:36Kohm,2%,1/4W,A	2	R160,R166	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	9	R103-108,R118-120	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	2	R207,R236	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	3	R195,R199,R212	
2001-000781	R-CARBON:47Kohm,2%,1/4W,A	2	R165,R177	
2001-000859	R-CARBON:56Kohm,2%,1/4W,A	5	R5,R15,R25,R35,R45	
2001-000859	R-CARBON:56Kohm,2%,1/4W,A	3	R55,R65,R171	
2001-000905	R-CARBON:62Kohm,2%,1/4W,A	1	R188	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R117	
2001-000960	R-CARBON:75Kohm,2%,1/4W,A	2	R162-163	
2001-000973	R-CARBON:8.2Kohm,2%,1/4W,	3	R148-149,R153	
2001-000973	R-CARBON:8.2Kohm,2%,1/4W,	5	R155-158,R233	
2001-000996	R-CARBON:82Kohm,2%,1/4W,A	4	R125,R128,R130-131	
2001-000996	R-CARBON:82Kohm,2%,1/4W,A	4	R139,R141,R143,R145	
2001-001011	R-CARBON:9.1Kohm,2%,1/4W,	1	R190	
2001-001028	R-CARBON:91Kohm,2%,1/4W,A	4	R99,R101,R187,R191	
2001-001028	R-CARBON:91Kohm,2%,1/4W,A	1	R189	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2003-000162	R-METAL OXIDE:120ohm,5%,2	6	R9-10,R19-20,R29-30	
2003-000162	R-METAL OXIDE:120ohm,5%,2	6	R39-40,R49-50,R59-60	
2003-000162	R-METAL OXIDE:120ohm,5%,2	2	R69-70	
2011-000284	R-NETWORK:1Kohm,2%,1/8W,A	1	RA4	
2201-000357	C-CERAMIC,DISC:20pF,5%,50	1	C88	
2201-000357	C-CERAMIC,DISC:20pF,5%,50	4	C67,C112-113,C168	
2201-000376	C-CERAMIC,DISC:220pF,5%,5	1	C90	
2201-000464	C-CERAMIC,DISC:30pF,5%,50	2	C97,C100	
2201-000558	C-CERAMIC,DISC:470pF,10%,	2	C83,C92	
2201-000642	C-CERAMIC,DISC:680pF,10%,	4	C75,C77,C85,C99	
2202-000603	C-CERAMIC,MLC-RADIAL:1uF,	1	C114	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C80-82,C84	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	25	C14,C45-66,C68-69	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C71-74	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	7	C87,C91,C93-96,C98	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	10	C101-102,C104-111	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	2	C135,C197	
2202-000686	C-CERAMIC,MLC-RADIAL:1nF,	1	C89	
2301-000175	C-FILM,PEF:15nF,5%,50V,7.	2	C123-124	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	3	C119-121	
2301-000335	C-FILM,PEF:10nF,5%,50V,6.	5	C115-118,C122,	
2305-000128	C-FILM,MPEF:100nF,10%,250	1	C126	
2305-000559	C-FILM,MPEF:100nF,10%,63V	8	C127-134	
2305-000596	C-FILM,MPEF:820nF,10%,250	3	C29,C34,C39	
2401-000023	C-AL:1uF,20%,50V,GP,5*11m	7	C2,C6,C10,C18,C22	
2401-000023	C-AL:1uF,20%,50V,GP,5*11m	2	C26,C145	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	5	C20,C23-24,C27-28	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C33,C38	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	4	C43,C70,C142,C144	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	6	C3,C4,C7,C9,C11-12	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C15,C19	
2401-000031	C-AL:47uF,20%,16V,GP,6.3*	1	C141	
2401-000032	C-AL:100uF,20%,50V,GP,10x	4	C32,C37,C42,C136	
2401-000050	C-AL:10uF,20%,16V,GP,5x11	2	C137,C143	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2401-000966	C-AL:22uF,20%,50V,GP,6.3*	3	C30,C35,C40	
2401-001349	C-AL:470uF,20%,10V,GP,10x	1	C140	
2401-001757	C-AL:22uF,20%,16V,GP,5x7m	6	C1,C5,C8,C13,C17,C21	
2401-001757	C-AL:22uF,20%,16V,GP,5x7m	1	C25	
2503-000140	C-NETWORK:220pF,5%,100V	4	CA1-3,CA5	
2801-000133	CRYSTAL-UNIT:12.288MHz,50	1	X2	0.002
2801-001363	CRYSTAL-UNIT:3.579545MHz,	2	X3-4	0.002
2801-001365	CRYSTAL-UNIT:32.768KHz,30	1	X1	0.002
3301-000345	CORE-FERRITE BEAD:ZZ,3.5x	1	L1	
3407-000121	SWITCH-DIP:24V,300mA,SLID	8	SW1-8	
3501-000380	RELAY-MINIATURE:24V,400mW	3	REL11-13	0.001
3501-000381	RELAY-MINIATURE:24V,200mW	10	REL1-10	0.001
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN1	
3704-000255	SOCKET-IC:32P,DIP,SN,2.54	1	U5	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	2	U2-3	
3710-000107	CONNECTOR-SHUNT:2P,1R,2.5	2	CN5-6	
3711-000118	CONNECTOR-HEADER:1WALL,10	1	CN2	
3711-001367	CONNECTOR-HEADER:2WALL,20	1	CN9	
3711-001479	CONNECTOR-HEADER:NOWALL,3	2	CN5-6	
3711-003103	CONNECTOR-HEADER:2WALL,40	1	CN12	
3722-000248	JACK-MODULAR:6P/4C,-,AU30	1	CN3	
4302-000126	BATTERY-NICD(2ND):3.6V;1.	1	BAT1	0.002
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	2	SRW1-2	
881 703810TA	IC-LIN,3810,MELODY IC:TO-	1	U38	
887 190016SH	,:-,-,-,-,-,-,	2	RA1-2	
895 530002AA	OPT-COUPL,TR,PC817:50%,12	3	U34-36	0.003
935 720053AA	CON-JACK PHONE:-,11.89X10	1	CN4	
935 810010AA	CON-TERMINAL,PLUG,TAB:TAB	1	CN7	
EC26-20501A	TRANS-AF:INFOREX,-,800mH	8	T12-19	0.001
GA13-10068A	IC-HYB:STA-1224,DANA/KP-0	3	HIC1-3	0.001
GA26-50053A	TRANS-MATCHING:EUEO 816,1	12	T1-5,T7-11,T20,T19	0.001

5.2 NX-820 BASE B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01121A	PBA:NEW ANALOG K/P,-,-,-,	1		
0401-000140	DIODE-SWITCHING:1N4148,10	66	D5-12,D51-108	0.001
0402-000165	DIODE-RECTIFIER:1N5819,40	2	D48-49	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	37	D1-4,D15-47	0.001
0403-000161	DIODE-ZENER:1N4751A,30V,5	8	ZD1-8	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	36	ZD9-44	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD45	0.001
0501-000295	TR-SMALL SIGNAL:KSA709,PN	8	Q19-26	0.002
0501-000332	TR-SMALL SIGNAL:KSC1009,N	29	Q3-18,Q27-39	0.002
0801-000412	IC-CMOS LOGIC:74HC32,OR G	1	U29	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	3	U9-11	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	4	U7-8,U30,U46	0.002
0801-000708	IC-CMOS LOGIC:74HC373,D L	1	U35	0.001
0801-000711	IC-CMOS LOGIC:74HC244,BUF	4	U5-6,U12,U38	0.001
0801-000722	IC-CMOS LOGIC:74HC245,TRA	2	U13,U31	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	2	U15,U40	0.001
0801-000913	IC-CMOS LOGIC:74HC74,D FL	2	U16,U25	0.001
0801-000918	IC-CMOS LOGIC:74HCT139,LI	2	U14,U54	0.001
0902-000223	IC-MICROPROCESSOR:64180,8	1	U27	0.001
0909-000102	IC-REAL TIME CLOCK:6242,4	1	U21	0.001
1106-000137	IC-SRAM:681000,128KX8BIT,	1	U22	0.001
1201-000250	IC-OP AMP:3403,DIP,14P,30	4	U32-33,U36-37	0.002
1202-000138	IC-VOLTAGE COMP.:1232,DIP	1	U26	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U39	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	4	U17-20	0.005
1205-000468	IC-DTMF GENERATOR:KS58015	1	U34	0.002
1205-000469	IC-DTMF RECEIVER:MT8870,D	3	U42-44	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-,	5	P1-4,P9	0.003
1405-000130	VARISTOR:270V,1200A,9x4.6	8	V15-22	0.003
1405-000137	VARISTOR:33V,250A,14x8.5m	8	V25-32	0.003
1405-000141	VARISTOR:390V,1200A,9x5.4	11	V1-11	0.003
1405-000141	VARISTOR:390V,1200A,9x5.4	1	V12	0.003

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000216	R-CARBON:1.2Kohm,2%,1/4W,	4	R146,R151,R165,R169	
2001-000216	R-CARBON:1.2Kohm,2%,1/4W,	3	R172,R177,R180	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	3	R137,R183-184	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	4	R186-187,R191-192	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	6	R9-12,R152,R159	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	10	R5-8,R49-51,R53-55	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	9	R57-59,R61-63,R65-67	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	6	R69-71,R78,R79,R136	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R73-75,R77,R120	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	7	R99-104,R116	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R188	
2001-000315	R-CARBON:120Kohm,2%,1/4W,	2	R155-156	
2001-000327	R-CARBON:12Kohm,2%,1/4W,A	4	R1-4	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	3	R97,R122-123	
2001-000393	R-CARBON:180Kohm,2%,1/4W,	4	R144-145,R166-167	
2001-000393	R-CARBON:180Kohm,2%,1/4W,	2	R174-175	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	11	R41-48,R52,R56,R60	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	5	R64,R68,R72,R76,R80	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	3	R117,R119,R121	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	6	R13-16,R147,R150	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	4	R160,R170,R173,R178	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	1	R181	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	16	R204-211,R213-220	
2001-000467	R-CARBON:2.7Kohm,2%,1/4W,	2	R153,R157	
2001-000532	R-CARBON:240ohm,2%,1/4W,A	1	R182	
2001-000543	R-CARBON:270Kohm,2%,1/4W,	2	R131,R135	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	18	R25-40,R141,R154	
2001-000620	R-CARBON:300Kohm,2%,1/4W,	1	R113	
2001-000648	R-CARBON:330ohm,2%,1/4W,A	1	R118	
2001-000654	R-CARBON:33Kohm,2%,1/4W,A	2	R133,R143	
2001-000675	R-CARBON:36Kohm,2%,1/4W,A	2	R138,R142	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	9	R98,R105-112	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	4	R126-129	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	3	R185,R189,R190	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000781	R-CARBON:47Kohm,2%,1/4W,A	2	R139,R158	
2001-000859	R-CARBON:56Kohm,2%,1/4W,A	9	R17-24,R134	
2001-000905	R-CARBON:62Kohm,2%,1/4W,A	1	R161	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R130	
2001-000960	R-CARBON:75Kohm,2%,1/4W,A	2	R132,R140	
2001-001011	R-CARBON:9.1Kohm,2%,1/4W,	1	R164	
2001-001028	R-CARBON:91Kohm,2%,1/4W,A	4	R148-149,R162,R168	
2001-001028	R-CARBON:91Kohm,2%,1/4W,A	4	R171,R176,R179,R163	
2003-000162	R-METAL OXIDE:120ohm,5%,2	16	R81-96	
2011-000284	R-NETWORK:1Kohm,2%,1/8W,A	2	RA4-5	
2201-000357	C-CERAMIC,DISC:20pF,5%,50	5	C95-96,C100-101,C132	
2201-000376	C-CERAMIC,DISC:220pF,5%,5	1	C137	
2201-000464	C-CERAMIC,DISC:30pF,5%,50	2	C170,C172	
2201-000558	C-CERAMIC,DISC:470pF,10%,	2	C131,C135	
2201-000642	C-CERAMIC,DISC:680pF,10%,	4	C141,C144,C159,C163	
2201-000642	C-CERAMIC,DISC:680pF,10%,	3	C121,C127,C138	
2202-000603	C-CERAMIC,MLC-RADIAL:1uF,	1	C81	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	17	C102-103,C105-119	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C152,C160,C162,C168	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	16	C82-94,C97-99	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C122-123,C129-130	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	3	C133-134,C142	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	8	C145-148,C154-157	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	2	C165-166	
2202-000675	C-CERAMIC,MLC-RADIAL:10nF	1	C150	
2202-000686	C-CERAMIC,MLC-RADIAL:1nF,	1	C149	
2301-000175	C-FILM,PEF:15nF,5%,50V,7.	2	C151,C153	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	3	C161,C169,C171	
2301-000335	C-FILM,PEF:10nF,5%,50V,6.	1	C139	
2301-000335	C-FILM,PEF:10nF,5%,50V,6.	3	C120,C124-5	
2305-000128	C-FILM,MPEF:100nF,10%,250	1	C174	
2305-000559	C-FILM,MPEF:100nF,10%,63V	6	C21-24,C29-30	
2305-000596	C-FILM,MPEF:820nF,10%,250	4	C1-4	
2401-000023	C-AL:1uF,20%,50V,GP,5*11m	8	C41-48	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2401-000028	C-AL:10uF,20%,50V,GP,5*11	22	C5-8,C53-68,C76-77	
2401-000031	C-AL:47uF,20%,16V,GP,6.3*	1	C74	
2401-000032	C-AL:100uF,20%,50V,GP,10x	6	C13-16,C72-73	
2401-000050	C-AL:10uF,20%,16V,GP,5x11	2	C70,C75	
2401-000966	C-AL:22uF,20%,50V,GP,6.3*	4	C9-12	
2401-001349	C-AL:470uF,20%,10V,GP,10x	3	C69,C71,C80	
2401-001757	C-AL:22uF,20%,16V,GP,5x7m	8	C33-40	
2503-000140	C-NETWORK:220pF,5%,100V	4	CA2-5	
2801-000133	CRYSTAL-UNIT:12.288MHz,50	1	X1	0.002
2801-001363	CRYSTAL-UNIT:3.579545MHz,	2	X3-4	0.002
2801-001365	CRYSTAL-UNIT:32.768KHz,30	1	X2	0.002
3301-000345	CORE-FERRITE BEAD:ZZ,3.5x	1	L2	
3501-000380	RELAY-MINIATURE:24V,400mW	4	REL1-4	0.002
3501-000381	RELAY-MINIATURE:24V,200mW	11	REL7-17	0.002
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN9	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN10	
3704-000189	SOCKET-IC:20P,DIP,SN,2.54	1	U28	
3704-000255	SOCKET-IC:32P,DIP,SN,2.54	1	U23	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	4	U17-20	
3710-000107	CONNECTOR-SHUNT:2P,1R,2.5	2	CN3,CN11	
3711-001367	CONNECTOR-HEADER:2WALL,20	3	CN4,CN7-8	
3711-001479	CONNECTOR-HEADER:NOWALL,3	2	CN3,CN11	
3711-003103	CONNECTOR-HEADER:2WALL,40	1	CN6	
3722-000248	JACK-MODULAR:6P/4C,-,AU30	1	CN2	
4302-000126	BATTERY-NICD(2ND):3.6V;1.	1	BAT1	0.002
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
881 703810TA	IC-LIN,3810,MELODY IC:TO-	1	U41	
887 190016SH	,:-,-,-,-,-,-,	2	RA2-3	
895 530002AA	OPT-COUPL,TR,PC817:50%,12	4	U1-4	
935 720053AA	CON-JACK PHONE:-,11.89X10	1	CN1	
EC26-20501A	TRANS-AF:INFOREX,-,800mH	4	T17-20	0.001
GA13-10068A	IC-HYB:STA-1224,DANA/KP-0	4	HIC1-HIC4	0.002
GA13-10070A	IC-HYB:EURO 816H,DANA/HYB	1	HIC10	0.002
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC9	0.002

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA26-50053A	TRANS-MATCHING:EUEO 816,1	17	T1-16,T25	0.001
JF27-20050A	COIL-AF:KP32,300UH,0.35OH	1	L1	

5.3 NX-1232 BASE B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01143A	PBA:NEW ANALOG K/P,-,-,-	1		
0401-000140	DIODE-SWITCHING:1N4148,10	18	D1-2,D28-43	0.001
0402-000165	DIODE-RECTIFIER:1N5819,40	2	D45-46	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	25	D3-27	0.001
0403-000161	DIODE-ZENER:1N4751A,30V,5	16	ZD1-16	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	52	ZD17-68	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD70	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	25	Q1-25	0.002
0801-000412	IC-CMOS LOGIC:74HC32,OR G	1	U31	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	3	U20-22	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	5	U10-11,U16,U23,U25	0.002
0801-000708	IC-CMOS LOGIC:74HC373,D L	1	U44	0.001
0801-000711	IC-CMOS LOGIC:74HC244,BUF	5	U9,U12,U15,U24,U50	0.001
0801-000722	IC-CMOS LOGIC:74HC245,TRA	2	U37,U42	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	2	U32,U38	0.001
0801-000913	IC-CMOS LOGIC:74HC74,D FL	2	U19,U39	0.001
0801-000918	IC-CMOS LOGIC:74HCT139,LI	2	U17,U43	0.002
0902-000223	IC-MICROPROCESSOR:64180,8	1	U36	0.001
0909-000102	IC-REAL TIME CLOCK:6242,4	1	U46	0.001
1106-000137	IC-SRAM:681000,128KX8BIT,	1	U34	0.001
1201-000250	IC-OP AMP:3403,DIP,14P,30	4	U13,U18,U41,U47	0.002
1202-000138	IC-VOLTAGE COMP.:1232,DIP	1	U49	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U51	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	5	U26-30	0.005
1205-000468	IC-DTMF GENERATOR:KS58015	1	U45	0.002
1205-000469	IC-DTMF RECEIVER:MT8870,D	4	U52-55	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-	9	P1-9	0.002
1405-000130	VARISTOR:270V,1200A,9x4.6	16	V1-3,V12-24	0.002
1405-000137	VARISTOR:33V,250A,14x8.5m	16	V41-56	0.002
1405-000141	VARISTOR:390V,1200A,9x5.4	24	V4-11,V25-40	0.002
2001-000216	R-CARBON:1.2Kohm,2%,1/4W,	5	R39,R41,R55,R59,R68	
2001-000216	R-CARBON:1.2Kohm,2%,1/4W,	3	R89-90,R106	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000267	R-CARBON:100Kohm,2%,1/4W,	4	R75,R108-109,R112	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	5	R118-120,R123,R126	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	8	R17,R24-25,R27-31	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	2	R97-98	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	13	R2,R11-16,R18-22,R26	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	1	R73	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	3	R92,R135,R146	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R124	
2001-000315	R-CARBON:120Kohm,2%,1/4W,	2	R102,R111	
2001-000327	R-CARBON:12Kohm,2%,1/4W,A	8	R3-10	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	3	R1,R94,R122	
2001-000393	R-CARBON:180Kohm,2%,1/4W,	5	R42,R53-54,R57,R86	
2001-000393	R-CARBON:180Kohm,2%,1/4W,	2	R87,R93	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	3	R136-137,R145	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	5	R37,R40,R69,R71-72	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	11	R78-85,R91,R95,R103	
2001-000467	R-CARBON:2.7Kohm,2%,1/4W,	2	R99-100	
2001-000532	R-CARBON:240ohm,2%,1/4W,A	1	R115	
2001-000543	R-CARBON:270Kohm,2%,1/4W,	2	R134,142	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	2	R96,R132	
2001-000620	R-CARBON:300Kohm,2%,1/4W,	1	R129	
2001-000648	R-CARBON:330ohm,2%,1/4W,A	1	R144	
2001-000654	R-CARBON:33Kohm,2%,1/4W,A	2	R127,R140	
2001-000675	R-CARBON:36Kohm,2%,1/4W,A	2	R133,R141	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	22	R32-36,R43-52,R61-67	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	3	R76-77,R110	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	4	R113,R117,R121,R125	
2001-000781	R-CARBON:47Kohm,2%,1/4W,A	2	R101,R138	
2001-000859	R-CARBON:56Kohm,2%,1/4W,A	1	R143	
2001-000905	R-CARBON:62Kohm,2%,1/4W,A	1	R105	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R23	
2001-000960	R-CARBON:75Kohm,2%,1/4W,A	2	R128,R139	
2001-001011	R-CARBON:9.1Kohm,2%,1/4W,	1	R116	
2001-001028	R-CARBON:91Kohm,2%,1/4W,A	5	R38,R56,R58,R60,R70	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-001028	R-CARBON:91Kohm,2%,1/4W,A	4	R74,R88,R104,R114	
2011-000284	R-NETWORK:1Kohm,2%,1/8W,A	2	RA6-7	
2201-000357	C-CERAMIC,DISC:20pF,5%,50	1	C135	
2201-000357	C-CERAMIC,DISC:20pF,5%,50	4	C124-125,C183-184	
2201-000376	C-CERAMIC,DISC:220pF,5%,5	1	C140	
2201-000464	C-CERAMIC,DISC:30pF,5%,50	3	C176,C178,C196	
2201-000558	C-CERAMIC,DISC:470pF,10%,	2	C108,C152	
2201-000642	C-CERAMIC,DISC:680pF,10%,	7	C83-86,C104,C106-107	
2201-000642	C-CERAMIC,DISC:680pF,10%,	1	C195	
2202-000603	C-CERAMIC,MLC-RADIAL:1uF,	1	C1	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	5	C99-103,C73	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	5	C43,C61-63,C66	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	3	C130,C138,C145	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	10	C89-90,C92-97,C69,71	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	18	C109,C118-123,C126	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C146-147,C149-150	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	9	C153,C156-162,C164	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	6	C168,C170-173,C175	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C177,C179,C180,C182	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	3	C186,C193-194	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	2	C128,C154	
2202-000675	C-CERAMIC,MLC-RADIAL:10nF	1	C136	
2202-000686	C-CERAMIC,MLC-RADIAL:1nF,	1	C151	
2301-000175	C-FILM,PEF:15nF,5%,50V,7.	2	C131,C148	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	4	C165-166,C174,C181	
2301-000335	C-FILM,PEF:10nF,5%,50V,6.	1	C198	
2301-000335	C-FILM,PEF:10nF,5%,50V,6.	3	C167,C169,C197	
2305-000128	C-FILM,MPEF:100nF,10%,250	1	C2	
2305-000559	C-FILM,MPEF:100nF,10%,63V	11	C44-51,C65,C67,C72	
2305-000559	C-FILM,MPEF:100nF,10%,63V	1	C74	
2305-000596	C-FILM,MPEF:820nF,10%,250	8	C3-10	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	32	C11-42	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	10	C53-60,C191,C199	
2401-000031	C-AL:47uF,20%,16V,GP,6.3*	1	C133	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2401-000032	C-AL:100uF,20%,50V,GP,10x	10	C75-82,C187,C190	
2401-000050	C-AL:10uF,20%,16V,GP,5x11	2	C192,163	
2401-000966	C-AL:22uF,20%,50V,GP,6.3*	8	C110-117	
2401-001349	C-AL:470uF,20%,10V,GP,10x	3	C52,C188-189	
2503-000140	C-NETWORK:220pF,5%,100V	4	CA1,CA3-5	
2801-000133	CRYSTAL-UNIT:12.288MHz,50	1	X1	0.002
2801-001363	CRYSTAL-UNIT:3.579545MHz,	2	X2,X4	0.002
2801-001365	CRYSTAL-UNIT:32.768KHz,30	1	X3	0.002
3301-000345	CORE-FERRITE BEAD:ZZ,3.5x	1	L2	
3407-000121	SWITCH-DIP:24V,300mA,SLID	8	SW1-8	
3501-000380	RELAY-MINIATURE:24V,400mW	8	REL20-27	0.001
3501-000381	RELAY-MINIATURE:24V,200mW	19	REL1-19	0.001
3702-000174	CONNECTOR-RIBBON:50P,FEMA	2	CN13-14	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN12	
3704-000189	SOCKET-IC:20P,DIP,SN,2.54	1	U33	
3704-000255	SOCKET-IC:32P,DIP,SN,2.54	1	U35	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	5	U26-30	
3710-000107	CONNECTOR-SHUNT:2P,1R,2.5	2	CN9-10	
3711-001367	CONNECTOR-HEADER:2WALL,20	5	CN3-5,CN7-8	
3711-001479	CONNECTOR-HEADER:NOWALL,3	2	CN9-10	
3711-003103	CONNECTOR-HEADER:2WALL,40	1	CN6	
3722-000248	JACK-MODULAR:6P/4C,-,AU30	1	CN2	
4302-000126	BATTERY-NICD(2ND):3.6V;1.	1	BAT1	0.002
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	6	SRW1-6	
6006-000130	SCREW-ASS'Y MACH:WS,PH,+,	1	SRW	
6021-000118	NUT-HEXAGON:1C,M3,ZPC(YEL	1	NUT	
881 703810TA	IC-LIN,3810,MELODY IC:TO-	1	U40	
887 190016SH	,:-,-,-,-,-,-,	4	RA1-4	
895 530002AA	OPT-COUPL,TR,PC817:50%,12	8	U1-8	0.003
935 720053AA	CON-JACK PHONE:-,11.89X10	1	CN1	
EC26-20501A	TRANS-AF:INFOREX,-,800mH	8	T18-25	
GA13-10068A	IC-HYB:STA-1224,DANA/KP-0	8	HIC17-24	0.001
GA13-10070A	IC-HYB:EURO 816H,DANA/HYB	2	HIC25-26	0.001
GA13-10099A	IC-HYB:SKP36HX,TYC/SLC-03	16	HIC1-16	0.001

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC35	0.001
GA26-50053A	TRANS-MATCHING:EUEO 816,1	25	T1-17,T26-33	0.001
GA62-30502A	HEAT SINK-TR:SKP-32H,A606	1	U51	
JF27-20050A	COIL-AF:KP32,300UH,0.35OH	1	L1	

5.4 NX-308 POWER B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01113A	PBA:NEW ANALOG K/P,-,-,-,	1		
0401-000140	DIODE-SWITCHING:1N4148,10	4	D13-16	0.001
0402-000118	DIODE-BRIDGE: 2F,200V,1.	1	BD1	0.001
0402-000155	DIODE-RECTIFIER:1N5401,10	6	D4-5,D18-21	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	1	D8	0.001
0403-000141	DIODE-ZENER:1N4735A,6.2V,	2	ZD2-3	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	2	ZD5-6	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	2	ZD1,ZD4	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	2	Q5-6	0.002
0502-000360	TR-POWER:TIP42C,PNP,-100V	2	Q8,Q10	0.002
0502-000392	TR-POWER:TIP41C,NPN,100V,	2	Q3,Q9	0.002
0503-000104	TR-DARLINGTON:2SB675,PNP,	1	Q1	0.001
1201-000188	IC-OP AMP:1458,DIP,8P,300	1	U8	0.001
1202-000162	IC-VOLTAGE COMP.:393,DIP,	2	U5-6	0.001
1203-000123	IC-NEGA.FIXED REG.:7661,D	1	U1	0.002
1203-000242	IC-POSI.FIXED REG.:7812,T	1	U4	0.002
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U7	0.002
1203-000420	IC-NEGA.FIXED REG.:7905,T	1	U2	0.002
1404-000126	THERMISTOR:4.85ohm,-,-,-,	1	P2	0.001
1404-000129	THERMISTOR:6.8ohm,-,-,-,-	1	P1	0.001
1405-000125	VARISTOR:220V,4500A,17x4.	1	V1	0.002
1405-000137	VARISTOR:33V,250A,14x8.5m	2	V4,V6	0.002
1405-000150	VARISTOR:470V,4500A,17.5x	2	V2-3	0.002
1405-000158	VARISTOR:56V,500A,13.5x4.	1	V5	0.002
2001-000102	R-CARBON:1.8Kohm,2%,1/4W,	1	R33	
2001-000229	R-CARBON:1.3Kohm,2%,1/4W,	1	R34	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	1	R23	
2001-000437	R-CARBON:1ohm,2%,1/4W,AA,	2	R44-45	
2001-000450	R-CARBON:2.2Mohm,2%,1/4W,	1	R12	
2001-000518	R-CARBON:22Kohm,2%,1/4W,A	1	R46	
2001-000536	R-CARBON:24Kohm,2%,1/4W,A	1	R21	
2001-000654	R-CARBON:33Kohm,2%,1/4W,A	1	R18	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000710	R-CARBON:3Kohm,2%,1/4W,AA	3	R30-32	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	4	R26-29	
2001-000805	R-CARBON:5.6Kohm,2%,1/4W,	1	R25	
2001-000926	R-CARBON:68Kohm,2%,1/4W,A	1	R15	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R24	
2001-000960	R-CARBON:75Kohm,2%,1/4W,A	1	R14	
2003-000370	R-METAL OXIDE:75ohm,5%,2W	1	R11	
2004-000813	R-METAL:340Kohm,1%,1/4W,A	1	R36	
2004-000861	R-METAL:39Kohm,1%,1/4W,AA	1	R38	
2004-001164	R-METAL:62Kohm,1%,1/4W,AA	4	R39-R42	
2004-001296	R-METAL:82Kohm,1%,1/4W,AA	1	R37	
2006-000173	R-CEMENT:5ohm,5%,5W,CA,BK	1	R3	
2103-000146	VR-SEMI:10Kohm,10%,1/2W,T	1	VR2	
2103-000445	VR-SEMI:50Kohm,10%,1/2W,T	1	VR1	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	9	C24-29,C42,C45-46	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	3	C41,C43,C44	
2305-000164	C-FILM,MPEF:10nF,10%,250V	1	C47	
2305-000596	C-FILM,MPEF:820nF,10%,250	1	C40	
2401-000023	C-AL:1uF,20%,50V,GP,5*11m	2	C16-17	
2401-000025	C-AL:100uF,20%,16V,GP,8x1	1	C11	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	3	C14-15,C39	
2401-000032	C-AL:100uF,20%,50V,GP,10x	4	C7-9,C38	
2401-000109	C-AL:10000uF,20%,50V,GP,2	1	C33	
2401-000151	C-AL:1000uF,20%,25V,GP,12	2	C31,C32	
2401-000310	C-AL:100uF,20%,25V,GP,8x1	1	C10	
2401-000711	C-AL:2200uF,20%,25V,GP,16	1	C30	
2401-001349	C-AL:470uF,20%,10V,GP,10x	2	C36-37	
2401-001430	C-AL:470uF,20%,50V,GP,13*	2	C34,C35	
3601-000241	FUSE-FERRULE:250V,2A,SLOW	1	FUS1	0.003
3601-000271	FUSE-FERRULE:250V,3A,SLOW	1	FUS2	0.003
3602-000126	FUSE-HOLDER:-,10A,20mohm	2	CN2,CN10	
3711-000118	CONNECTOR-HEADER:1WALL,10	1	CN14	
3711-000236	CONNECTOR-HEADER:1WALL,4P	1	CN15	
3711-000265	CONNECTOR-HEADER:1WALL,5P	1	CN16	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
3711-000961	CONNECTOR-HEADER:BOX,4P,1	1	CN17	
3711-002083	CONNECTOR-HEADER:1WALL,2P	1	CN9	
6006-000130	SCREW-ASS'Y MACH:WS,PH,+,	4	Q3,Q9,Q10,U4	
6021-000118	NUT-HEXAGON:1C,M3,ZPC(YEL	4	Q3,Q4,Q10,U4	
935 810010AA	CON-TERMINAL,PLUG,TAB:TAB	3	CN11-13	
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC1	0.003
GA26-30071A	TRANS-POWER:TT-308H,7V//7	1	T1	0.002
GA62-30501A	HEAT SINK-TR:SKP-24D,A606	2	HTS3-4	
GA62-30502A	HEAT SINK-TR:SKP-32H,A606	2	HTS1-2	
JF27-20050A	COIL-AF:KP32,300UH,0.35OH	1	L1	

5.5 NX-820/1232 POWER B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01123A	PBA;NEW ANALOG K/P,-,-,-,	1		
0401-000140	DIODE-SWITCHING;1N4148,10	8	D9-16	0.001
0402-000118	DIODE-BRIDGE; 2F,200V,1.	1	BD1	0.001
0402-000155	DIODE-RECTIFIER;1N5401,10	3	D4-6	0.001
0402-000345	DIODE-RECTIFIER;1N4004,40	2	D7-8	0.001
0403-000141	DIODE-ZENER;1N4735A,6.2V,	4	ZD2-5	0.001
0403-000223	DIODE-ZENER;1N749A,4.3V,5	2	ZD6-7	0.001
0403-000548	DIODE-ZENER;1N5339,5.6V,5	1	ZD1	0.001
0501-000332	TR-SMALL SIGNAL;KSC1009,N	3	Q4-6	0.002
0502-000360	TR-POWER;TIP42C,PNP,-100V	2	Q7-8	0.002
0502-000392	TR-POWER;TIP41C,NPN,100V,	2	Q2-3	0.002
0503-000104	TR-DARLINGTON;2SB675,PNP,	1	Q1	0.002
1201-000188	IC-OP AMP;1458,DIP,8P,300	2	U7-8	0.002
1202-000162	IC-VOLTAGE COMP.;393,DIP,	2	U5-6	0.002
1203-000123	IC-NEGA.FIXED REG.;7661,D	1	U1	0.002
1203-000242	IC-POSI.FIXED REG.;7812,T	1	U4	0.002
1203-000263	IC-POSI.FIXED REG.;7824,T	1	U3	0.002
1203-000420	IC-NEGA.FIXED REG.;7905,T	1	U2	0.002
1404-000129	THERMISTOR;6.8ohm,-,-,-,-	1	P1	0.003
1405-000125	VARISTOR;220V,4500A,17x4.	1	V1	0.003
1405-000137	VARISTOR;33V,250A,14x8.5m	2	V4,V6	0.003
1405-000150	VARISTOR;470V,4500A,17.5x	2	V2-3	0.003
1405-000158	VARISTOR;56V,500A,13.5x4.	1	V5	0.003
2001-000102	R-CARBON;1.8Kohm,2%,1/4W,	1	R33	
2001-000229	R-CARBON;1.3Kohm,2%,1/4W,	1	R34	
2001-000284	R-CARBON;10Kohm,2%,1/4W,A	2	R22-23	
2001-000437	R-CARBON;1ohm,2%,1/4W,AA,	2	R35-36	
2001-000450	R-CARBON;2.2Mohm,2%,1/4W,	1	R12	
2001-000518	R-CARBON;22Kohm,2%,1/4W,A	1	R37	
2001-000536	R-CARBON;24Kohm,2%,1/4W,A	2	R20-21	
2001-000654	R-CARBON;33Kohm,2%,1/4W,A	1	R18	
2001-000697	R-CARBON;39Kohm,2%,1/4W,A	1	R17	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000710	R-CARBON:3Kohm,2%,1/4W,AA	3	R30-R32	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	4	R26-29	
2001-000781	R-CARBON:47Kohm,2%,1/4W,A	1	R16	
2001-000805	R-CARBON:5.6Kohm,2%,1/4W,	1	R25	
2001-000926	R-CARBON:68Kohm,2%,1/4W,A	1	R15	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R24	
2001-000960	R-CARBON:75Kohm,2%,1/4W,A	1	R14	
2001-000996	R-CARBON:82Kohm,2%,1/4W,A	1	R13	
2003-000370	R-METAL OXIDE:75ohm,5%,2W	1	R11	
2004-000813	R-METAL:340Kohm,1%,1/4W,A	1	R4	
2004-000861	R-METAL:39Kohm,1%,1/4W,AA	1	R10	
2004-001164	R-METAL:62Kohm,1%,1/4W,AA	4	R6-9	
2004-001296	R-METAL:82Kohm,1%,1/4W,AA	1	R5	
2006-000145	R-CEMENT:10ohm,5%,5W,CA,B	1	R3	
2103-000146	VR-SEMI:10Kohm,10%,1/2W,T	1	VR2	
2103-000445	VR-SEMI:50Kohm,10%,1/2W,T	1	VR1	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	8	C20-21,C24-29	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	3	C19,C22,C23	
2305-000164	C-FILM,MPEF:10nF,10%,250V	1	C30	
2305-000596	C-FILM,MPEF:820nF,10%,250	1	C18	
2401-000023	C-AL:1uF,20%,50V,GP,5*11m	2	C16-17	
2401-000025	C-AL:100uF,20%,16V,GP,8x1	1	C11	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	4	C12-15	
2401-000032	C-AL:100uF,20%,50V,GP,10x	3	C7-9	
2401-000109	C-AL:10000uF,20%,50V,GP,2	1	C4	
2401-000151	C-AL:1000uF,20%,25V,GP,12	2	C2-3	
2401-000310	C-AL:100uF,20%,25V,GP,8x1	1	C10	
2401-000711	C-AL:2200uF,20%,25V,GP,16	1	C1	
2401-001430	C-AL:470uF,20%,50V,GP,13*	2	C5-6	
3501-000170	RELAY-MINIATURE:24V,360mW	1	REL1	0.001
3601-000241	FUSE-FERRULE:250V,2A,SLOW	1	FUS1	0.003
3601-000271	FUSE-FERRULE:250V,3A,SLOW	1	FUS2	0.003
3602-000126	FUSE-HOLDER:-,10A,20mohm	2	CN1,CN2	
3711-000118	CONNECTOR-HEADER:1WALL,10	1	CN6	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
3711-000265	CONNECTOR-HEADER:1WALL,5P	2	CN7-8	
3711-000961	CONNECTOR-HEADER:BOX,4P,1	1	CN10	
3711-002083	CONNECTOR-HEADER:1WALL,2P	1	CN9	
6006-000130	SCREW-ASS'Y MACH:WS,PH,+,	5	Q1-3,Q7,U4	
6021-000118	NUT-HEXAGON:1C,M3,ZPC(YEL	3	Q1,Q2,Q7	
893 390138AA	DIODE-REC,RS403L,:-,4A,1V	2	BD2,BD3	0.001
935 810010AA	CON-TERMINAL,PLUG,TAB:TAB	3	CN3-5	
GA26-30071A	TRANS-POWER:TT-308H,7V//7	1	T1	0.002
GA62-30502A	HEAT SINK-TR:SKP-32H,A606	3	HTS3-5	
GA62-30510A	HEAT SINK TR:SKP-32H,A606	2	HTS1-2	

5.6 NX-4SLI B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01139A	PBA:NEW ANALOG K/P,-,-,-	1		
0401-000140	DIODE-SWITCHING:1N4148,10	12	D2-6,D10-11,D13-17	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	9	D21-22,D24-28,D32-33	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	7	D35-39,D43-44	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	8	D1,D7-9,D12,D18-20	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	6	D23,D29-31,D34,D40	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	2	D41,D42	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	8	ZD2-ZD9	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD1	0.001
0501-000295	TR-SMALL SIGNAL:KSA709,PN	4	Q5,Q8,Q11,Q14	0.002
0501-000332	TR-SMALL SIGNAL:KSC1009,N	8	Q1-4,Q6-7,Q9-10	0.002
0501-000332	TR-SMALL SIGNAL:KSC1009,N	4	Q12-13,Q15-16	0.002
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U3	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U2,U7	0.002
0801-000711	IC-CMOS LOGIC:74HC244,BUF	2	U4-5	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U6	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U9	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1205-000469	IC-DTMF RECEIVER:MT8870,D	1	U8	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-	1	P1	0.003
1405-000130	VARISTOR:270V,1200A,9x4.6	4	V1-4	0.003
1405-000137	VARISTOR:33V,250A,14x8.5m	4	V5-8	0.003
2001-000267	R-CARBON:100Kohm,2%,1/4W,	2	R46-47	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	9	R8-10,R18-20,R28-30	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R38-40,R50,R52	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R48	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R51,R53	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	5	R1,R7,R11,R17,R21	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	3	R27,R31,R37	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	5	R4,R6,R14,R16,R24	
2001-000558	R-CARBON:27Kohm,2%,1/4W,A	3	R26,R34,R36	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	4	R42-45	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000752	R-CARBON:430Kohm,2%,1/4W,	1	R49	
2001-000859	R-CARBON:56Kohm,2%,1/4W,A	4	R5,R15,R25,R35	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R41	
2003-000162	R-METAL OXIDE:120ohm,5%,2	6	R2-3,R12-13,R22-23	
2003-000162	R-METAL OXIDE:120ohm,5%,2	2	R32-33	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	13	C1-13	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	1	C14	
2401-000023	C-AL:1uF,20%,50V,GP,5*11m	4	C25,C29,C33,C37	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	3	C15-17	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	1	C21	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	5	C24,C26,C28,C30,C32	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	3	C34,C36,C38	
2401-000032	C-AL:100uF,20%,50V,GP,10x	3	C18-20	
2401-001349	C-AL:470uF,20%,10V,GP,10x	1	C22	
2401-001757	C-AL:22uF,20%,16V,GP,5x7m	4	C23,C27,C31,C35	
2801-001363	CRYSTAL-UNIT:3.579545MHz,	1	X1	0.002
3501-000381	RELAY-MINIATURE:24V,200mW	4	REL1-REL4	0.002
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
6041-000110	RIVET-BLIND:D3.25,L8.5,ZP	2	M1,M2	
887 190016SH	,,-,-,-,-,-,-,	1	RA1	
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC1	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	4	T1-T4	0.002
GA64-30500A	LOCKER-LATCH:SKP-816,-,WH	1	LOK	
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	

5.7 NX-4KLI B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01137A	PBA:NEW ANALOG K/P,-,-,-,	1		
0403-000223	DIODE-ZENER:1N749A,4.3V,5	8	ZD1-ZD8	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD9	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U6	0.001
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U2,U4	0.001
0801-000711	IC-CMOS LOGIC:74HC244,BUF	1	U3	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U5	0.001
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1404-000126	THERMISTOR:4.85ohm,-,-,-,	5	P1-5	0.001
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	2	R2,R3	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R1,R4	
2201-000558	C-CERAMIC,DISC:470pF,10%,	1	C20	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	8	C1-C8	
2305-000559	C-FILM,MPEF:100nF,10%,63V	6	C9-C14	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C15,C16	
2401-000032	C-AL:100uF,20%,50V,GP,10x	3	C17-C19	
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
6041-000110	RIVET-BLIND:D3.25,L8	2	M1,M2	
EC26-20501A	TRANS-AF:INFOREX,-,800mH	4	T1,T3,T5,T7	0.001
GA13-10070A	IC-HYB:EURO 816H,DANA/HYB	1	HIC1	0.002
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC2	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	4	T2,T4,T6,T8	0.001
GA64-30500A	LOCKER-LATCH:SKP-816,-,WH	1	LOK	
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	
JF27-60051A	COIL-FILTER:CF5400,60uH,5	1	L1	

5.8 NX-2TRK B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01135A	PBA:NEW ANALOG K/P,-,-,-	1		
0401-000140	DIODE-SWITCHING:1N4148,10	4	D2-3,D5-6	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	2	D1,D4	0.001
0403-000161	DIODE-ZENER:1N4751A,30V,5	4	ZD1-4	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	4	ZD9-12	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD17	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	2	Q1-Q2	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U3	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U4,U5	0.001
0801-000711	IC-CMOS LOGIC:74HC244,BUF	2	U2,U6	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U8	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U13	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1205-000469	IC-DTMF RECEIVER:MT8870,D	1	U7	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-	1	P1	0.003
1405-000141	VARISTOR:390V,1200A,9x5.4	6	V1-V6	0.003
2001-000267	R-CARBON:100Kohm,2%,1/4W,	2	R12-13	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	2	R15-16	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	4	R2-3,R21,R23	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R6	
2001-000327	R-CARBON:12Kohm,2%,1/4W,A	2	R28-29	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R1,R5	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	2	R20,R22	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	2	R10-11	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	1	R7	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R14	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	12	C1-12	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	1	C13	
2305-000596	C-FILM,MPEF:820nF,10%,250	2	C14-15	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	1	C41	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	1	C37	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	3	C24,C27,C38	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2401-000032	C-AL:100uF,20%,50V,GP,10x	5	C18-19,C39-40,C42	
2401-000966	C-AL:22uF,20%,50V,GP,6.3*	2	C22,C25	
2401-001349	C-AL:470uF,20%,10V,GP,10x	1	C34	
2801-001363	CRYSTAL-UNIT:3.579545MHz,	1	X1	0.002
3501-000380	RELAY-MINIATURE:24V,400mW	2	REL1-2	0.001
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
6041-000110	RIVET-BLIND:D3.25,L8.5,ZP	2	M1,M2	
895 53	0229 OPT-COUPL,TR,PC817:5	2	U9-10	0.002
GA13-10068A	IC-HYB:STA-1224,DANA/KP-0	2	HIC1-2	0.001
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC9	0.001
GA26-50053A	TRANS-MATCHING:EUEO 816,1	2	T1-2	0.001
GA64-30500A	LOCKER-LATCH:SKP-816,-,WH	1	LOK	
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	

5.9 NX-4TRK B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01133A	PBA:NEW ANALOG K/P,-,-,-,	1		
0401-000140	DIODE-SWITCHING:1N4148,10	6	D2-3,D5-6,D8-9	0.001
0401-000140	DIODE-SWITCHING:1N4148,10	2	D11-12	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	4	D1,D4,D7,D10	0.001
0403-000161	DIODE-ZENER:1N4751A,30V,5	8	ZD1-8	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	8	ZD9-ZD16	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD17	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	4	Q1-Q4	0.002
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U3	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U4,U5	0.001
0801-000711	IC-CMOS LOGIC:74HC244,BUF	2	U2,U6	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U8	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U13	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1205-000469	IC-DTMF RECEIVER:MT8870,D	1	U7	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-,	1	P1	0.003
1405-000141	VARISTOR:390V,1200A,9x5.4	12	V1-V12	0.003
2001-000267	R-CARBON:100Kohm,2%,1/4W,	2	R12,R13	
2001-000276	R-CARBON:100ohm,2%,1/4W,A	4	R15,R16,R18,R19	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	6	R2-3,R21,R23,R25,R27	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R6	
2001-000327	R-CARBON:12Kohm,2%,1/4W,A	4	R28-31	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R1,R5	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	4	R20,R22,R24,R26	
2001-000437	R-CARBON:1ohm,2%,1/4W,AA,	1	R4	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	4	R8-11	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	1	R7	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R14	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	12	C1-12	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	1	C13	
2305-000596	C-FILM,MPEF:820nF,10%,250	4	C14-C17	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	1	C37	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2401-000028	C-AL:10uF,20%,50V,GP,5*11	5	C24,C27,C30,C33,C38	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	1	C41	
2401-000032	C-AL:100uF,20%,50V,GP,10x	7	C18-21,C39-40,C42	
2401-000966	C-AL:22uF,20%,50V,GP,6.3*	4	C22,C25,C28,C31	
2401-001349	C-AL:470uF,20%,10V,GP,10x	1	C34	
2801-001363	CRYSTAL-UNIT:3.579545MHz,	1	X1	0.002
3501-000380	RELAY-MINIATURE:24V,400mW	4	REL1-4	0.002
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
895 530002AA	OPT-COUPL,TR,PC817:50%,12	4	U9-12	0.002
GA13-10068A	IC-HYB:STA-1224,DANA/KP-0	4	HIC1-HIC4	0.002
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC9	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	4	T1-T4	0.002
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	

5.10 NX-4OPX B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01141A	PBA:NEW ANALOG K/P,-,-,-,	1		
0402-000345	DIODE-RECTIFIER:1N4004,40	4	D1-D4	0.001
0402-000350	DIODE-RECTIFIER:1N4935,20	1	D5	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	8	ZD2-ZD9	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD1	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	4	Q1-Q4	0.002
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U6	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U2,U5	0.002
0801-000711	IC-CMOS LOGIC:74HC244,BUF	2	U3,U4	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U7	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U9	0.002
1203-000428	IC-POSI.ADJUST REG.:2577,	1	U10	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1205-000469	IC-DTMF RECEIVER:MT8870,D	1	U8	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-,	1	P1	0.002
1405-000125	VARISTOR:220V,4500A,17x4.	12	V1-V12	0.003
1405-000164	VARISTOR:68V,250A,9x4.2mm	5	V13-V17	0.003
2001-000267	R-CARBON:100Kohm,2%,1/4W,	2	R7,R8	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	2	R3,R17	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R4	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R1-2	
2001-000573	R-CARBON:2Kohm,2%,1/4W,AA	1	R14	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	4	R9-R12	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	1	R5	
2001-000775	R-CARBON:470ohm,2%,1/4W,A	1	R15	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R6	
2001-000960	R-CARBON:75Kohm,2%,1/4W,A	1	R13	
2003-000293	R-METAL OXIDE:4.7Kohm,5%,	1	R16	
2202-000656	C-CERAMIC,MLC-RADIAL:100n	1	C32	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	12	C1-C8,C28-C31	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	1	C33	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C17,C20	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2401-000028	C-AL:10uF,20%,50V,GP,5*11	1	C18	
2401-000032	C-AL:100uF,20%,50V,GP,10x	3	C21-C23	
2401-000499	C-AL:10uF,20%,63V,GP,6.3*	8	C9-C16	
2401-000966	C-AL:22uF,20%,50V,GP,6.3*	1	C27	
2401-001216	C-AL:4.7uF,20%,100V,GP,6.	1	C24	
2401-001349	C-AL:470uF,20%,10V,GP,10x	1	C19	
2401-001442	C-AL:470uF,20%,63V,GP,13x	2	C25,C26	
2801-001363	CRYSTAL-UNIT:3.579545MHz,	1	X1	0.002
3501-000381	RELAY-MINIATURE:24V,200mW	4	REL1-REL4	0.001
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
6006-000130	SCREW-ASS'Y MACH:WS,PH,+,	1	SRW5	
6021-000118	NUT-HEXAGON:1C,M3,ZPC(YEL	1	NUT1	
6041-000110	RIVET-BLIND:D3.25,L8.5,ZP	2	M1,M2	
887 190016	,:-,-,-,-,-,-,	1	RA1	
GA13-10100A	IC-HYB:STA-1224,TYC/SLC-0	4	HIC2-HIC5	0.002
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC1	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	4	T1-T4	0.001
GA27-20052A	COIL-AF:SKP-612,170uH,-,7	1	L1	
GA64-30500A	LOCKER-LATCH:SKP-816,-,WH	1	LOK	
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	

5.11 NX-8SLI B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01147A	PBA:NEW ANALOG K/P,-,-,-,	1		
0402-000345	DIODE-RECTIFIER:1N4004,40	8	D1-D8	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	16	ZD1-ZD16	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD17	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	8	Q1-8	0.002
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U7	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U2,U5	0.002
0801-000711	IC-CMOS LOGIC:74HC244,BUF	2	U3-4	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U6	0.001
1203-000263	IC-POSI.FIXED REG.:7824,T	1	U9	0.002
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1205-000469	IC-DTMF RECEIVER:MT8870,D	1	U8	0.003
1404-000126	THERMISTOR:4.85ohm,-,-,-,	1	P1	0.003
1405-000130	VARISTOR:270V,1200A,9x4.6	8	V1-8	0.003
1405-000137	VARISTOR:33V,250A,14x8.5m	8	V9-16	0.003
2001-000267	R-CARBON:100Kohm,2%,1/4W,	2	R8-9	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	2	R2,R4	
2001-000298	R-CARBON:10ohm,2%,1/4W,AA	1	R6	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R1,R3	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	8	R10-17	
2001-000752	R-CARBON:430Kohm,2%,1/4W,	1	R7	
2001-000941	R-CARBON:7.5Kohm,2%,1/4W,	1	R5	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	13	C1-11,C13-14	
2301-000332	C-FILM,PEF:100nF,5%,50V,1	1	C12	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	4	C31,C33,C34,C38	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	16	C15-30	
2401-000032	C-AL:100uF,20%,50V,GP,10x	3	C35-37	
2401-001349	C-AL:470uF,20%,10V,GP,10x	1	C32	
2801-001363	CRYSTAL-UNIT:3.579545MHz,	1	X1	0.002
3501-000381	RELAY-MINIATURE:24V,200mW	8	REL1-REL8	0.002
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
6041-000110	RIVET-BLIND:D3.25,L8.5,ZP	2	M1,M2	
887 190016SH	,:-,-,-,-,-,-	2	RA1,RA2	
GA13-10099A	IC-HYB:SKP36HX,TYC/SLC-03	8	HIC1-8	0.002
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC11	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	8	T1-T8	0.001
GA64-30500A	LOCKER-LATCH:SKP-816,-,WH	1	LOK	
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	

5.12 NX-8KLI B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01145A	PBA:NEW ANALOG K/P,-,-,-,	1		
0403-000223	DIODE-ZENER:1N749A,4.3V,5	16	ZD1-16	0.001
0403-000548	DIODE-ZENER:1N5339,5.6V,5	1	ZD17	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U7	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	2	U2,U5	0.002
0801-000711	IC-CMOS LOGIC:74HC244,BUF	2	U3,U4	0.001
0801-000900	IC-CMOS LOGIC:74HC04,INVE	1	U6	0.001
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1404-000126	THERMISTOR:4.85ohm,-,-,-,	9	P1-P9	0.003
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	2	R1,R2	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R3-4	
2201-000558	C-CERAMIC,DISC:470pF,10%,	1	C27	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	9	C1-9	
2305-000559	C-FILM,MPEF:100nF,10%,63V	12	C10-17,C23-26	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C18,C19	
2401-000032	C-AL:100uF,20%,50V,GP,10x	3	C20-22	
3702-000174	CONNECTOR-RIBBON:50P,FEMA	1	CN2	
3703-000191	CONNECTOR-DIN:64P,2R,MALE	1	CN1	
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
6002-000154	SCREW-TAPPING:PH,+,2,M3,L	4	SRW1-4	
EC26-20501A	TRANS-AF:INFOREX,-,800mH	6	T1,T3,T5,T7,T9,T11	0.001
EC26-20501A	TRANS-AF:INFOREX,-,800mH	2	T13,T15	0.001
GA13-10070A	IC-HYB:EURO 816H,DANA/HYB	2	HIC1-2	0.002
GA13-10108A	IC-HYB:SKP-308,SANK/SI820	1	HIC3	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	6	T2,T4,T6,T8,T10,T12	0.001
GA26-50053A	TRANS-MATCHING:EUEO 816,1	2	T14,T16	0.001
GA64-30500A	LOCKER-LATCH:SKP-816,-,WH	1	LOK	
GA70-10691A	IPR-STIFFENER B:NEW ANA	1	S1	
JF27-60051A	COIL-FILTER:CF5400,60uH,5	1	L1	

5.13 NX-DOORPHONE/PAGING B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01115A	PBA:NEW ANALOG K/P,-,-,-,	1		
0402-000165	DIODE-RECTIFIER:1N5819,40	2	D3-4	0.001
0402-000345	DIODE-RECTIFIER:1N4004,40	2	D1,D2	0.001
0403-000223	DIODE-ZENER:1N749A,4.3V,5	6	ZD1-6	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	2	Q1-2	0.002
0801-000412	IC-CMOS LOGIC:74HC32,OR G	1	U10	0.001
0801-000485	IC-CMOS LOGIC:74HCT138,3-	1	U5	0.002
0801-000526	IC-CMOS LOGIC:74HCT374,D	3	U2-3,U9	0.002
0801-000711	IC-CMOS LOGIC:74HC244,BUF	1	U4	0.001
0801-000902	IC-CMOS LOGIC:74HC02,NOR	1	U7	0.001
0801-000922	IC-CMOS LOGIC:74HCT125,BU	1	U8	0.001
1002-001004	IC-A/D&D/A CONVERTER:MSM6	2	U11-12	0.001
1106-000137	IC-SRAM:681000,128KX8BIT,	2	U13-14	0.001
1201-000250	IC-OP AMP:3403,DIP,14P,30	1	U6	0.002
1202-000115	IC-VOLTAGE COMP.:8054,TO-	1	U15	0.001
1205-000149	IC-CROSSPOINT SWITCH:M349	1	U1	0.005
1205-000337	IC-TONE DETECTOR:SSI75T98	1	U16	0.001
1405-000137	VARISTOR:33V,250A,14x8.5m	2	V1-2	0.003
2001-000103	R-CARBON:220ohm,2%,1/4W,A	1	R10	
2001-000216	R-CARBON:1.2Kohm,2%,1/4W,	3	R23,R26-27	
2001-000237	R-CARBON:1.5Kohm,2%,1/4W,	1	R22	
2001-000267	R-CARBON:100Kohm,2%,1/4W,	1	R34	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R11,R14,R30,R33,R35	
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	1	R36	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	4	R8-9,R1-2	
2001-000364	R-CARBON:15Kohm,2%,1/4W,A	1	R31	
2001-000436	R-CARBON:1ohm,0%,1/4W,AA,	2	R24,R28	
2001-000500	R-CARBON:20ohm,2%,1/4W,AA	1	R18	
2001-000536	R-CARBON:24Kohm,2%,1/4W,A	2	R19-20	
2001-000620	R-CARBON:300Kohm,2%,1/4W,	4	R4,R6,R29,R32	
2001-000629	R-CARBON:30Kohm,2%,1/4W,A	2	R5,R7	
2001-000648	R-CARBON:330ohm,2%,1/4W,A	1	R3	

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	2	R12-13	
2001-000781	R-CARBON:47Kohm,2%,1/4W,A	1	R17	
2001-000853	R-CARBON:560ohm,2%,1/4W,A	1	R21	
2001-000870	R-CARBON:5Kohm,2%,1/4W,AA	2	R15-16	
2001-000973	R-CARBON:8.2Kohm,2%,1/4W,	1	R25	
2011-000203	R-NETWORK:10Kohm,5%,1/8W,	1	RA1	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	16	C1-14,C16,C20	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	3	C22-24,	
2202-000675	C-CERAMIC,MLC-RADIAL:10nF	2	C25-26	
2202-000686	C-CERAMIC,MLC-RADIAL:1nF,	4	C18,C21,C31,C34	
2301-000353	C-FILM,PEF:4.7nF,5%,50V,8	1	C29	
2301-000356	C-FILM,PEF:47nF,5%,50V,7.	3	C30,C32-33	
2305-000128	C-FILM,MPEF:100nF,10%,250	2	C27-28	
2401-000025	C-AL:100uF,20%,16V,GP,8x1	1	C43	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	3	C41,C44,C46	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C42,C45	
2401-000031	C-AL:47uF,20%,16V,GP,6.3*	1	C39	
2401-000032	C-AL:100uF,20%,50V,GP,10x	1	C40	
2401-000499	C-AL:10uF,20%,63V,GP,6.3*	4	C35-38	
2801-001363	CRYSTAL-UNIT:3.579545MHz,	1	X1	0.002
3501-000381	RELAY-MINIATURE:24V,200mW	2	REL1,REL2	0.002
3704-000275	SOCKET-IC:40P,DIP,SN,2.54	1	U1	
3710-000107	CONNECTOR-SHUNT:2P,1R,2.5	1	CN7	
3710-001047	CONNECTOR-SOCKET:40P,2R,2	1	CN1	
3711-001479	CONNECTOR-HEADER:NOWALL,3	1	CN7	
3722-000248	JACK-MODULAR:6P/4C,-,AU30	4	CN2-5	
4302-000126	BATTERY-NICD(2ND):3.6V;1.	1	BAT1	0.002
895 530002AA	OPT-COUPL,TR,PC817:50%,12	2	U17-18	0.002
897 130505AB	VARI,:1.5V,-,0.3W,-,	1	V3	0.001
935 720053AA	CON-JACK PHONE:-,11.89X10	1	CN6	
GA13-10099A	IC-HYB:SKP36HX,TYC/SLC-03	2	HIC1-2	0.002
GA26-50053A	TRANS-MATCHING:EUEO 816,1	3	T1-3	0.001

5.14 NX-SMDR/R-MMC B'D

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01117A	PBA:NEW ANALOG K/P,-,-,-,	1		
1006-000275	IC-LINE DRIVER:1488,DIP,1	1	U2	0.002
1006-000283	IC-LINE RECEIVER:1489,DIP	1	U3	0.002
1203-000123	IC-NEGA.FIXED REG.:7661,D	1	U1	0.001
2001-000276	R-CARBON:100ohm,2%,1/4W,A	8	R1-8	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	3	C1-C3	
2401-000028	C-AL:10uF,20%,50V,GP,5*11	2	C4-C5	
3710-000317	CONNECTOR-SOCKET:20P,2R,2	1	CN1	
935 100109FA	CON-D-SUB,9P,RECEPTACLE:A	2	CN2,CN3	

5.15 NX-MPD B'D

5.15.1 12 kHz

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	FFR
GA92-01129A	PBA:NEW ANALOG K/P,-,-,-,	1		
0801-000918	IC-CMOS LOGIC:74HCT139,LI	1	U1	0.002
0801-000922	IC-CMOS LOGIC:74HCT125,BU	1	U2	0.001
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C1,C2,C7,C8	
2305-000332	C-FILM,MPEF:3.3nF,2%,200V	4	C3-C6	
3710-000317	CONNECTOR-SOCKET:20P	1	CN1	
GA13-10564A	IC-HYB:TARGET,KP-MPD,SIP,	2	HIC1-2	0.001

5.15.1 16 kHz

SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	
GA92-01131A	PBA:NEW ANALOG K/P,-,-,-,	1		
0801-000918	IC-CMOS LOGIC:74HCT139,LI	1	U1	0.002
0801-000922	IC-CMOS LOGIC:74HCT125,BU	1	U2	0.001
2202-000658	C-CERAMIC,MLC-RADIAL:100n	4	C1,C2,C7,C8	
2305-000332	C-FILM,MPEF:3.3nF,2%,200V	4	C3-C6	
3710-000317	CONNECTOR-SOCKET:20P	1	CN1	
GA13-10004A	IC-ASIC:DCS/COMPACT EURO,	2	HIC1-2	0.001

5.16 NX-PRS B'D

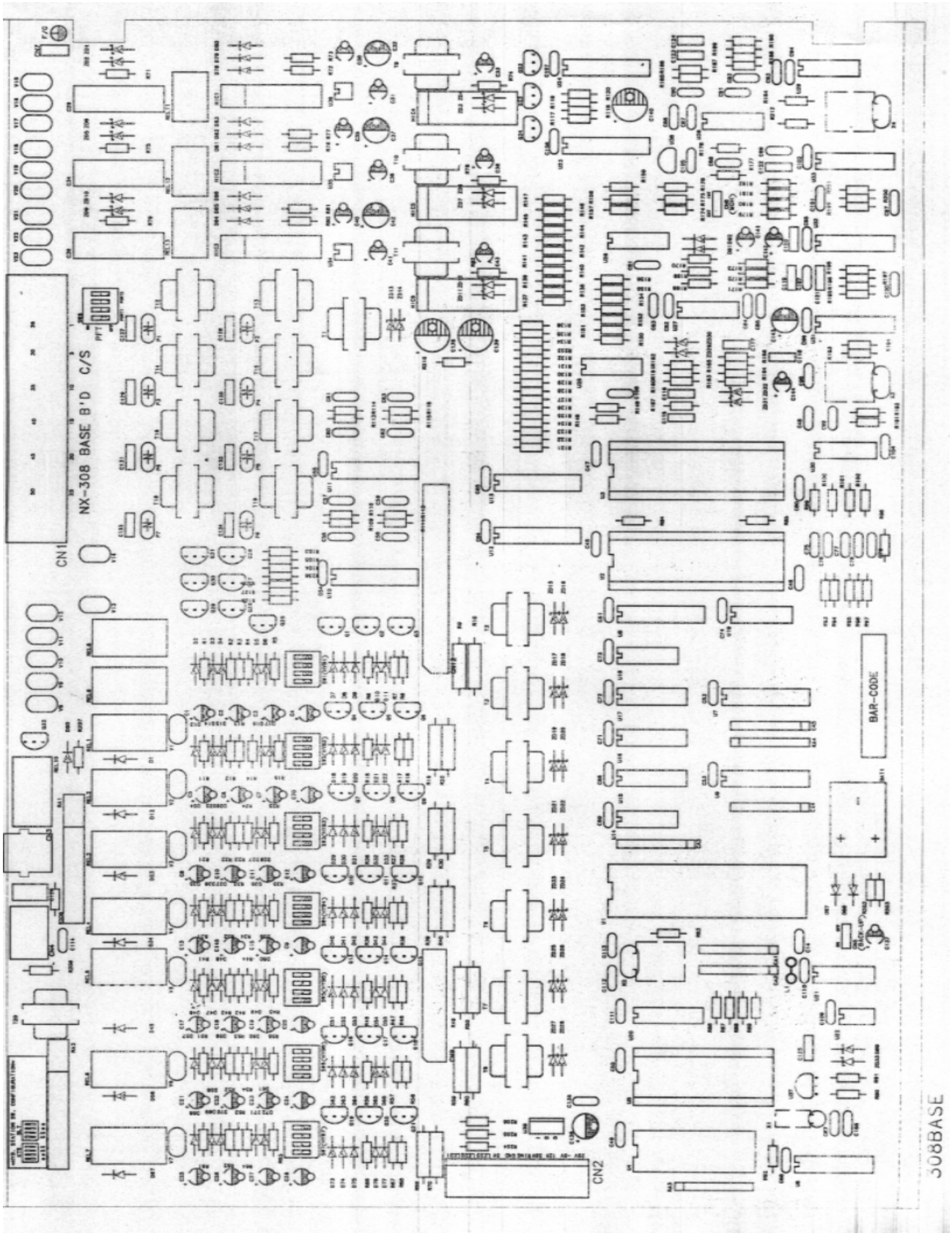
SEC CODE	DESCRIPTION	Q'TY	COMPONENT NAME	
GA92-01127A	PBA:NEW ANALOG K/P,-,-,-,	1		
0402-000345	DIODE-RECTIFIER:1N4004,40	4	D1-D4	0.001
0501-000332	TR-SMALL SIGNAL:KSC1009,N	2	Q1,Q2	0.002
0801-000913	IC-CMOS LOGIC:74HC74,D FL	1	U6	0.001
0801-000918	IC-CMOS LOGIC:74HCT139,LI	1	U2	0.002
0801-000922	IC-CMOS LOGIC:74HCT125,BU	1	U1	0.001
1202-000162	IC-VOLTAGE COMP.:393,DIP,	1	U3	0.002
2001-000284	R-CARBON:10Kohm,2%,1/4W,A	5	R1-3,R6-7	
2001-000327	R-CARBON:12Kohm,2%,1/4W,A	2	R4,R8	
2001-000358	R-CARBON:150ohm,2%,1/4W,A	2	R15-16	
2001-000393	R-CARBON:180Kohm,2%,1/4W,	2	R10,R13	
2001-000423	R-CARBON:1Kohm,2%,1/4W,AA	2	R12,R19	
2001-000654	R-CARBON:33Kohm,2%,1/4W,A	2	R11,R14	
2001-000726	R-CARBON:4.7Kohm,2%,1/4W,	2	R17,R18	
2001-000781	R-CARBON:47Kohm,2%,1/4W,A	2	R5,R9	
2201-000376	C-CERAMIC,DISC:220pF,5%,5	2	C11-12	
2202-000658	C-CERAMIC,MLC-RADIAL:100n	8	C1-3,C6-10	
2202-000686	C-CERAMIC,MLC-RADIAL:1nF,	2	C4-5	
3501-000380	RELAY-MINIATURE:24V,400mW	2	REL1-2	0.002
3710-000317	CONNECTOR-SOCKET:20P,2R,2	1	CN1	
895 530002AA	OPT-COUPL,TR,PC817:50%,12	2	U4-5	0.002

4.PBA LAYOUT

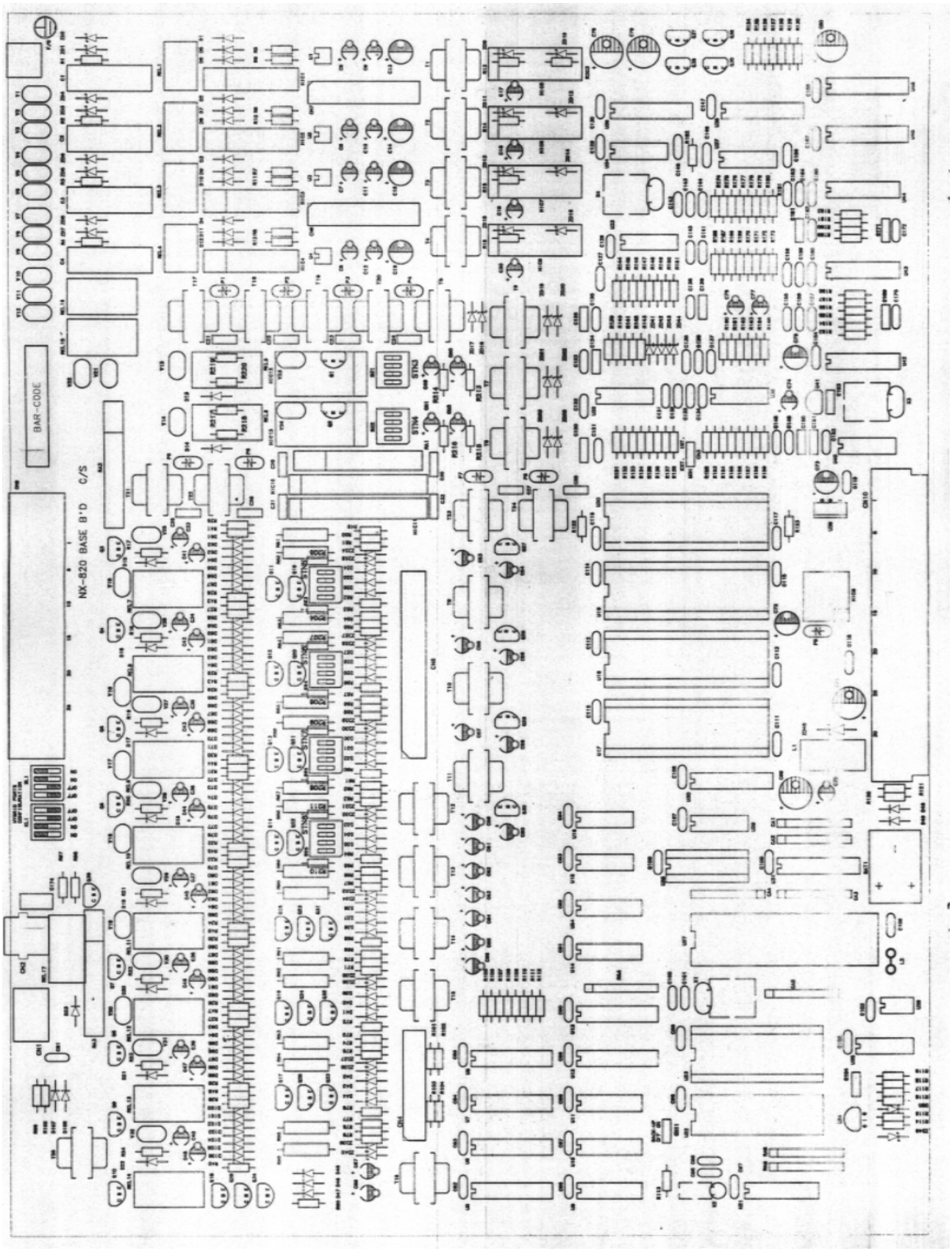
4.1 NX-308 BASE B'D.....4-1
4.2 NX-820 BASE B'D.....4-2
4.3 NX-1232 BASE B'D.....4-3
4.4 NX-308 POWER B'D.....4-4
4.5 NX-820/1232 POWER B'D.....4-5
4.6 NX-4SLI EXP B'D.....4-6
4.7 NX-4KLI EXP B'D.....4-7
4.8 NX-2TRK/4TRK B'D.....4-8
4.9 NX-4OPX B'D.....4-9
4.10NX-8SLI EXP B'D.....4-10
4.11NX-8KLI EXP B'D.....4-11
4.12NX-SMDR / R-MMC B'D.....4-12
4.13NX-MPD B'D.....4-13
4.14NX-PRS D-B'D.....4-14
4.15NX-DOOR/PAGING B'D.....4-15
4.16NX-DOOR/PAGING W/VMS B'D.....4-16

4. PBA LAYOUT

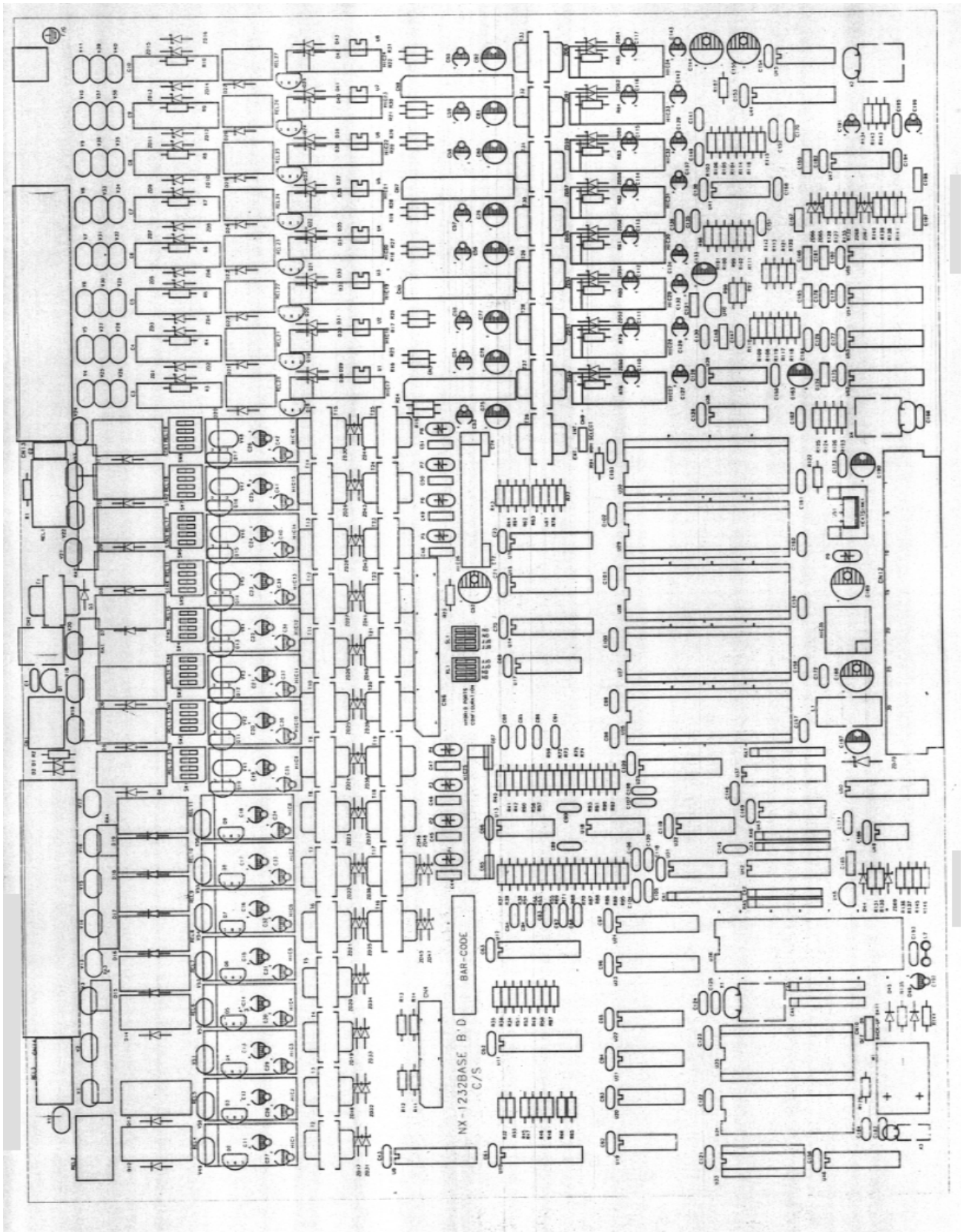
4 . 1NX-308 BASE B'D



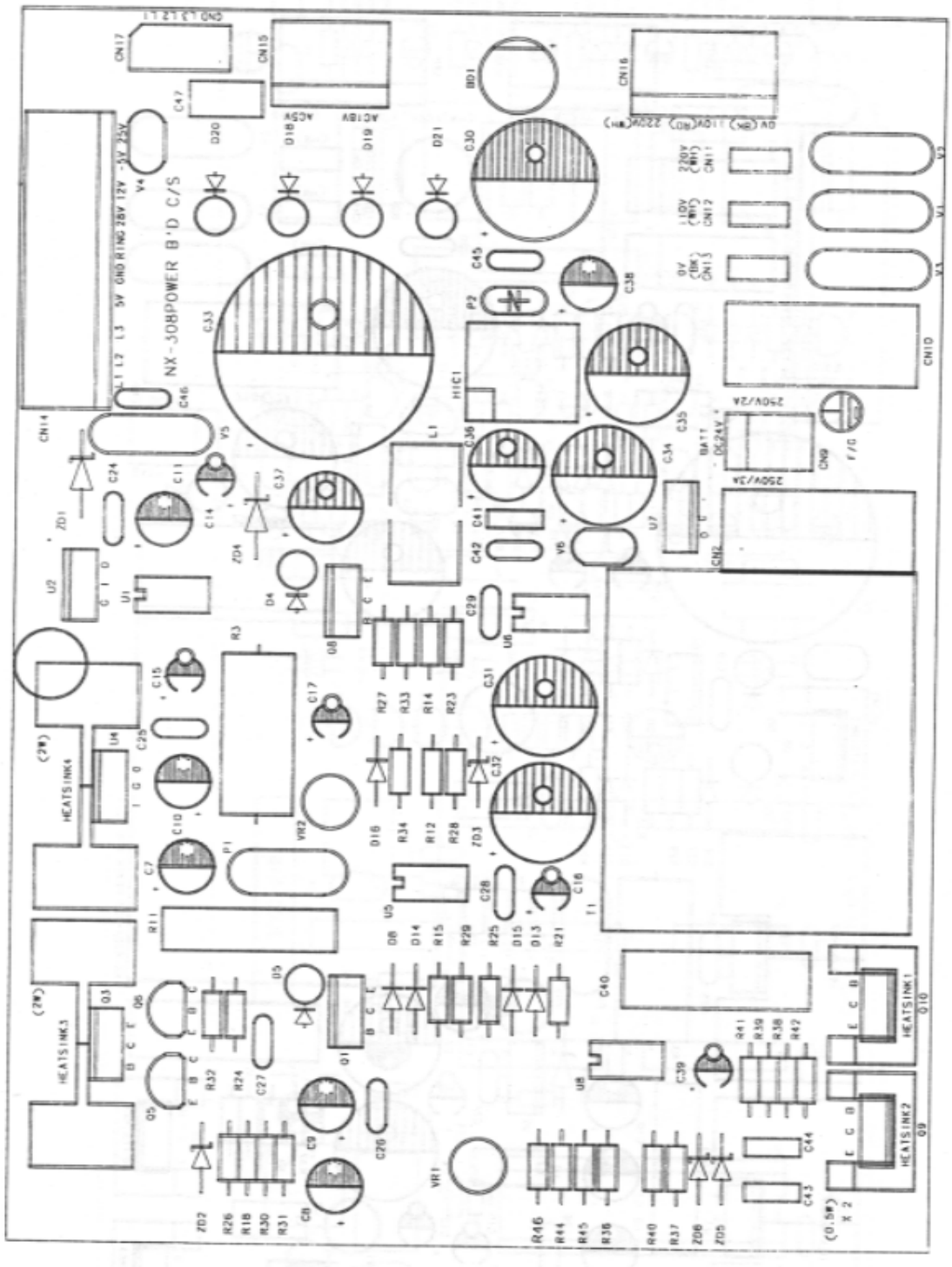
4.2 NX-820 BASE B'D



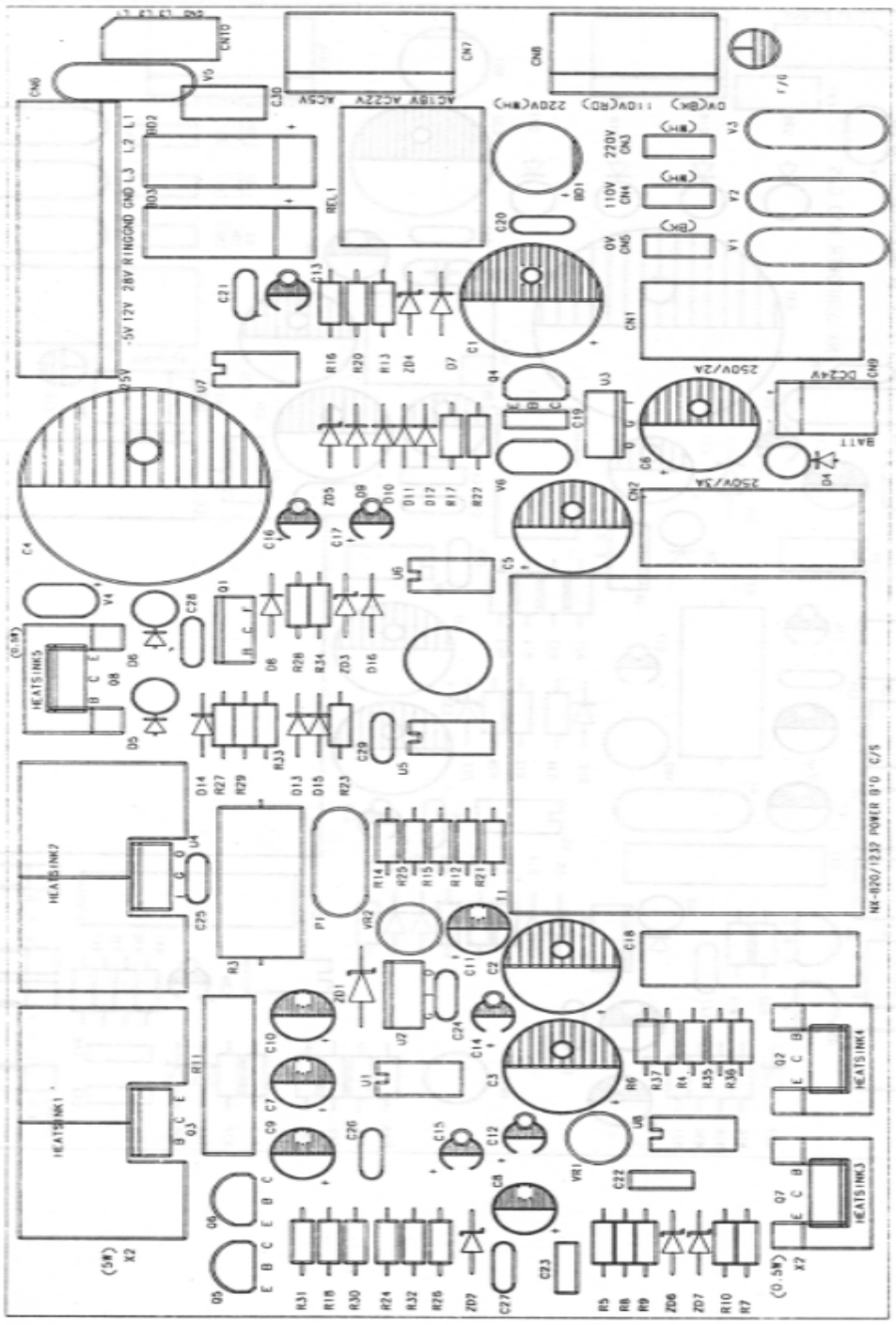
4.3 NX-1232 BASE B'D



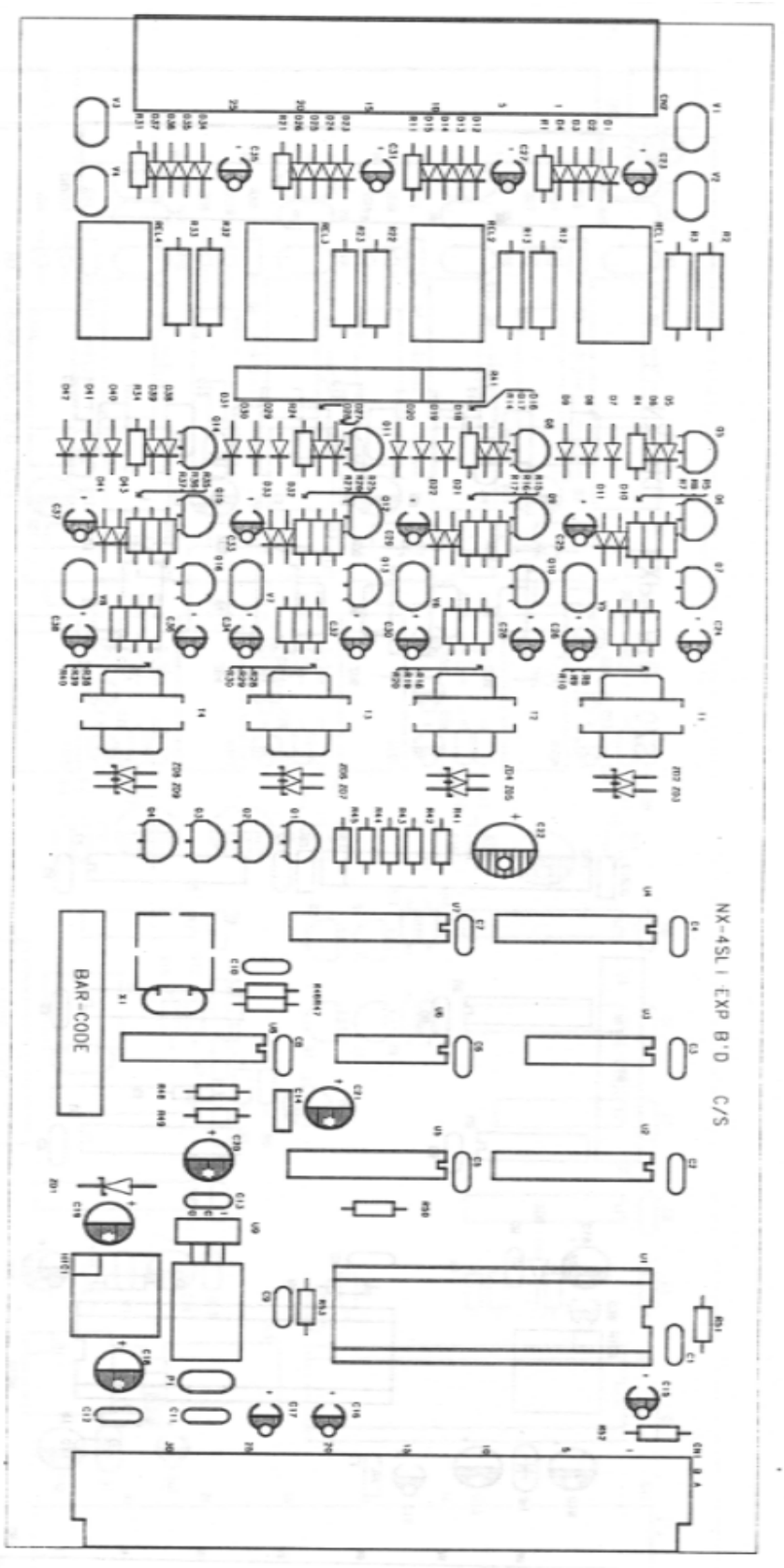
4.4 NX-308 POWER B'D



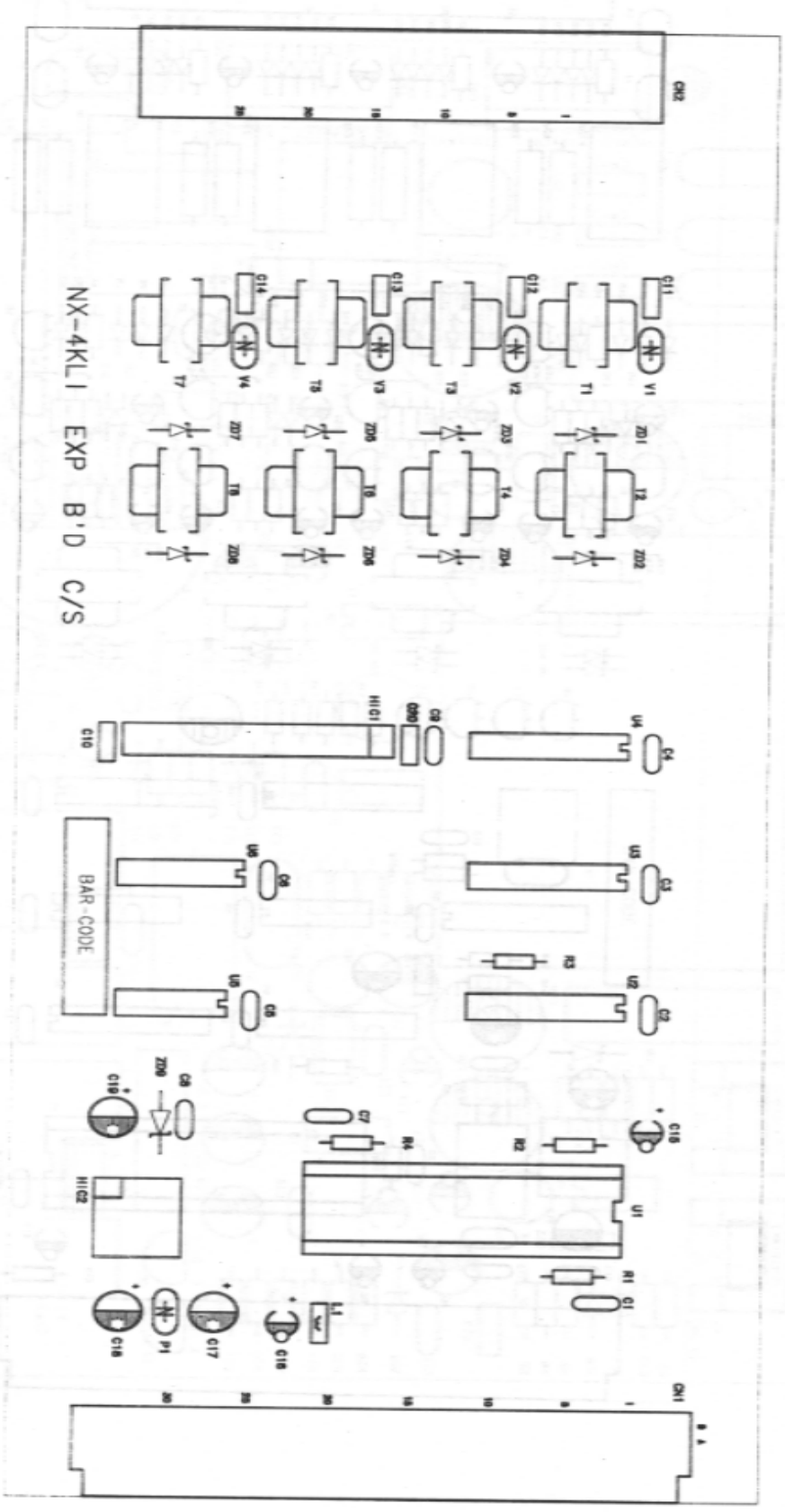
4.5 NX-820/1232 POWER B'D



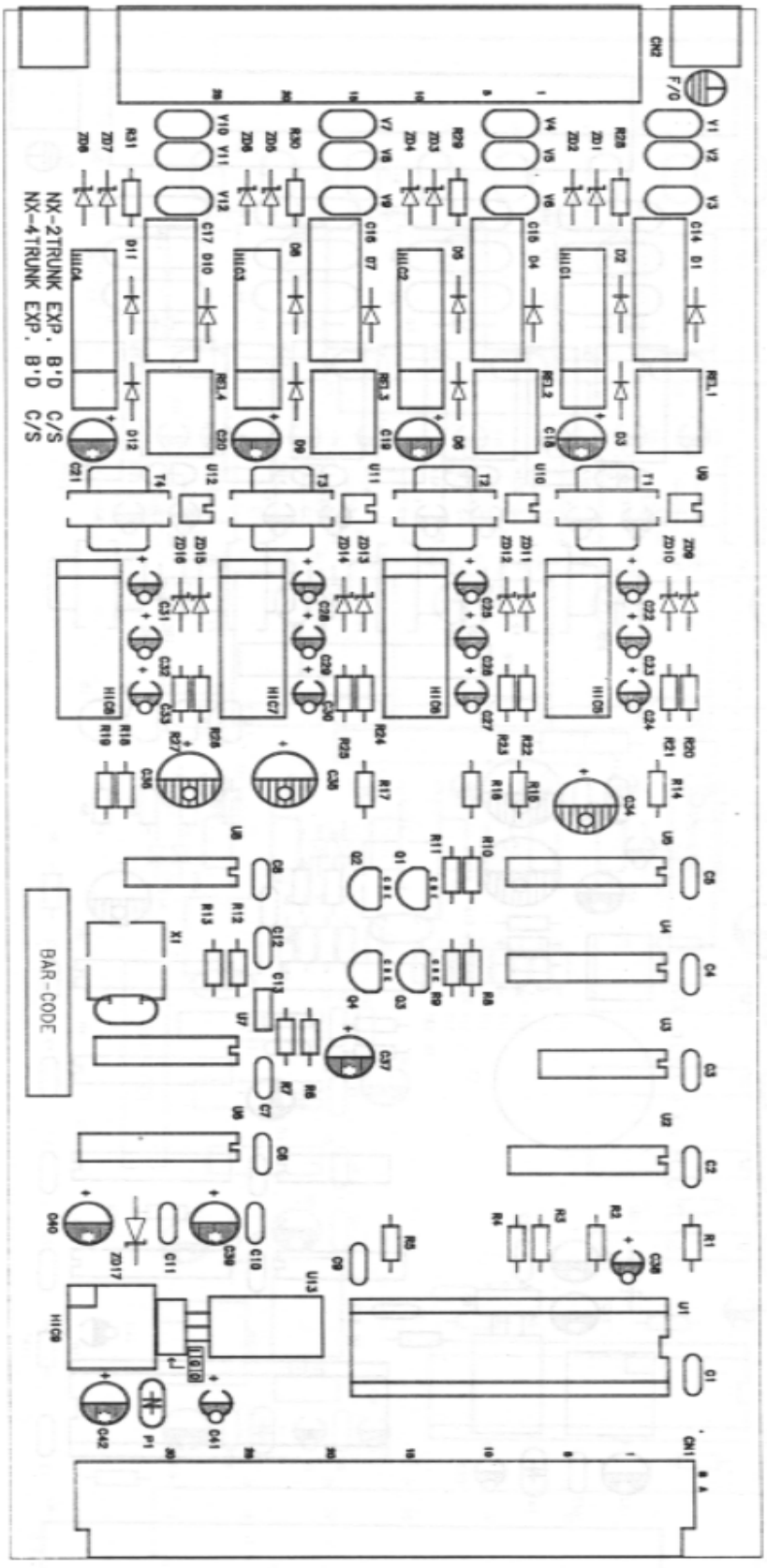
4.6 NX-4SLI EXP B'D



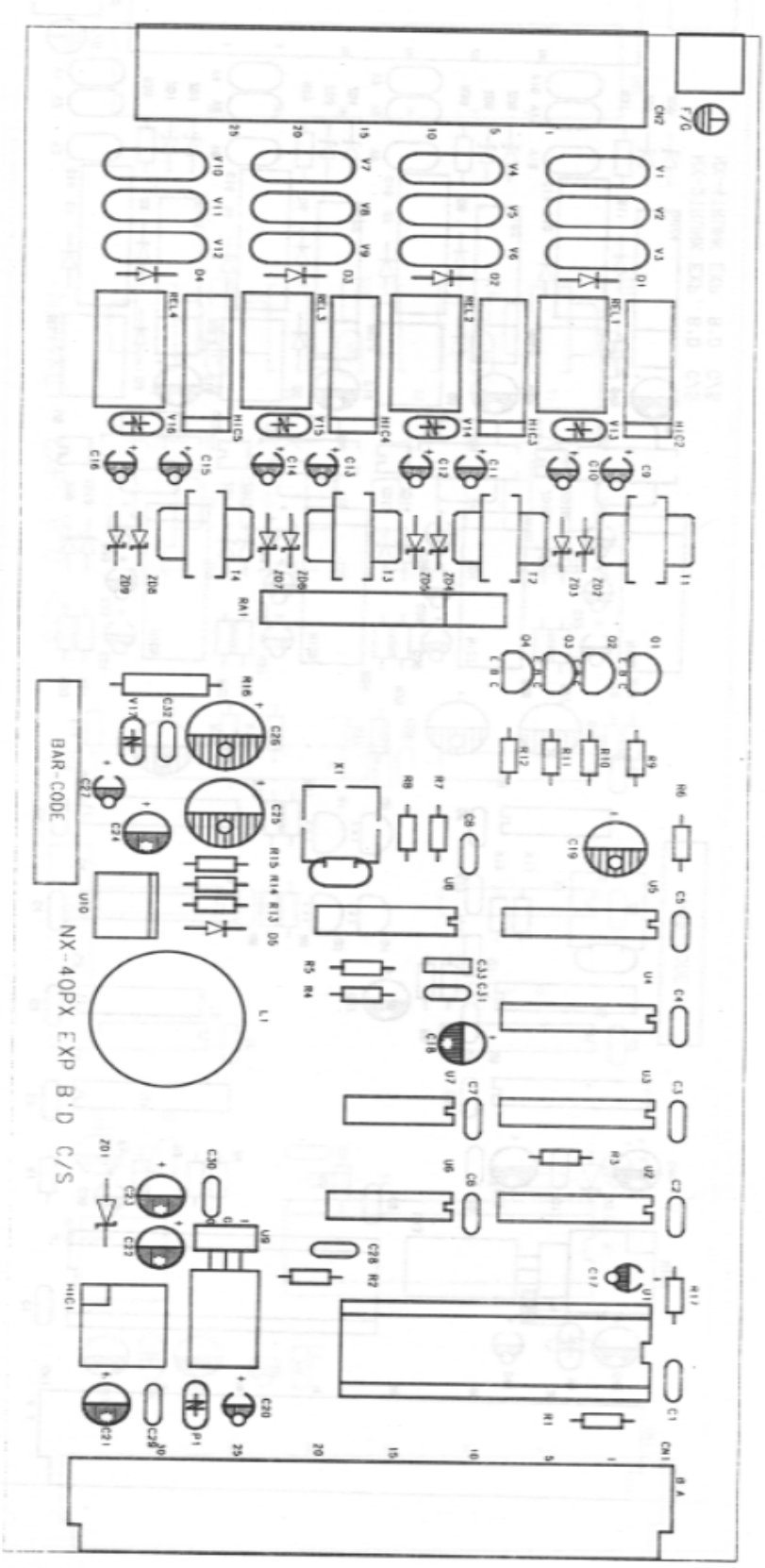
4.7 NX-4KLI EXP B'D



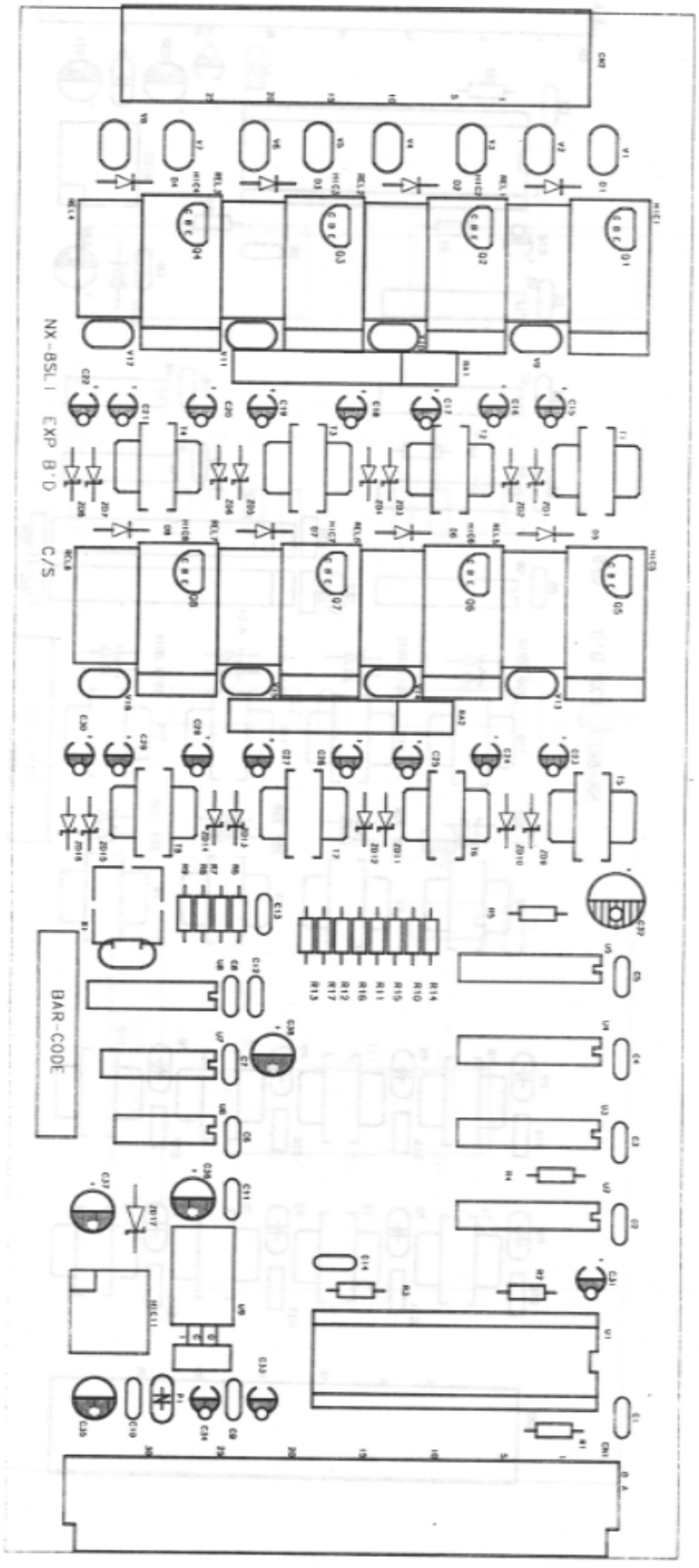
4.8 NX-2TRK/4TRK B'D



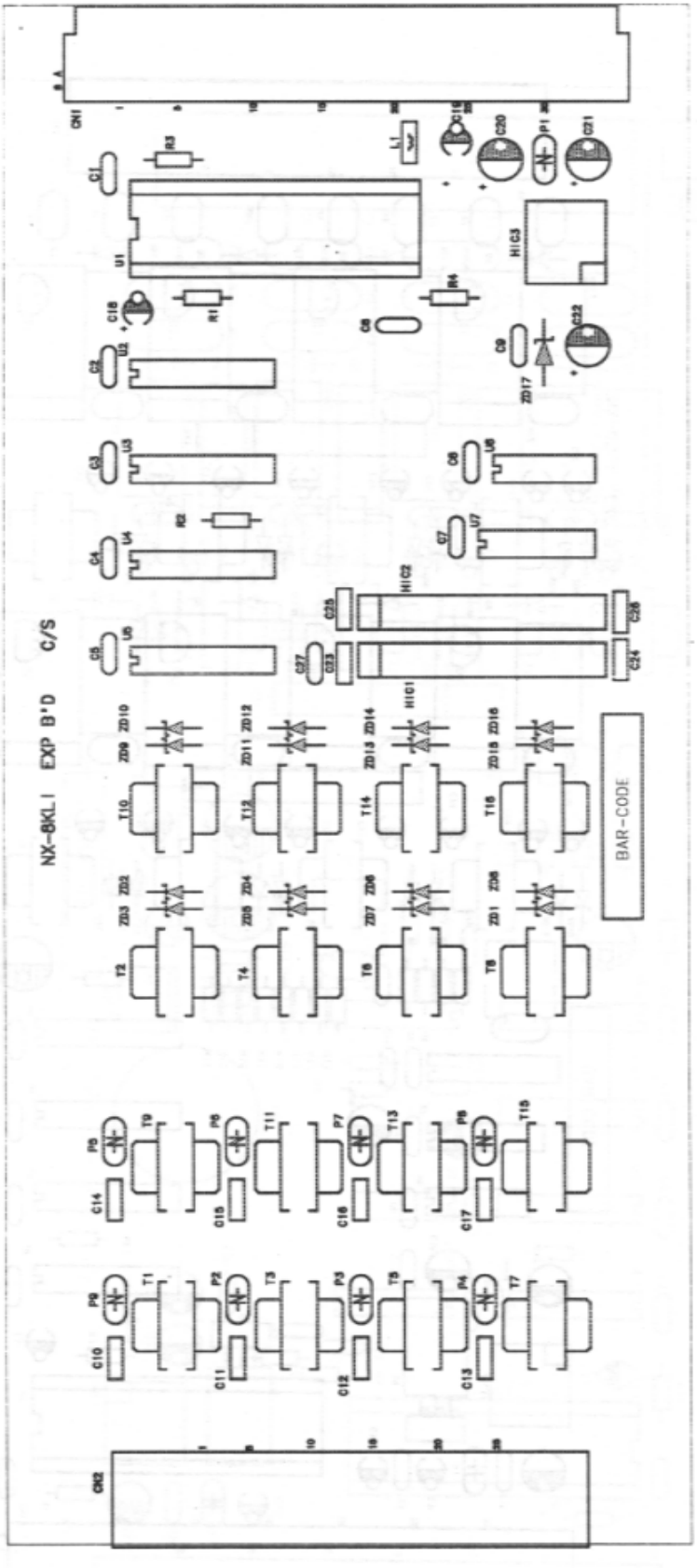
4.9 NX-4OPX B'D



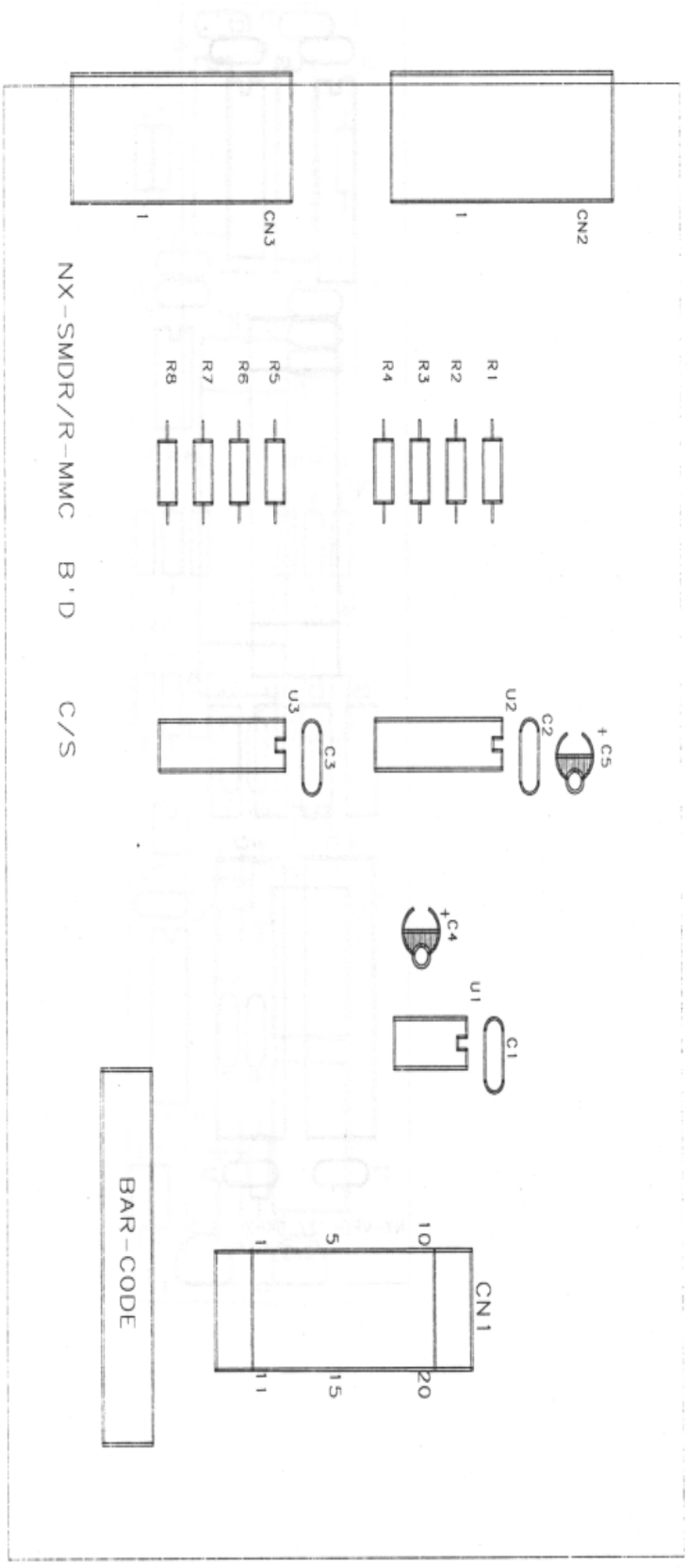
4.10 NX-8SLI EXP B'D



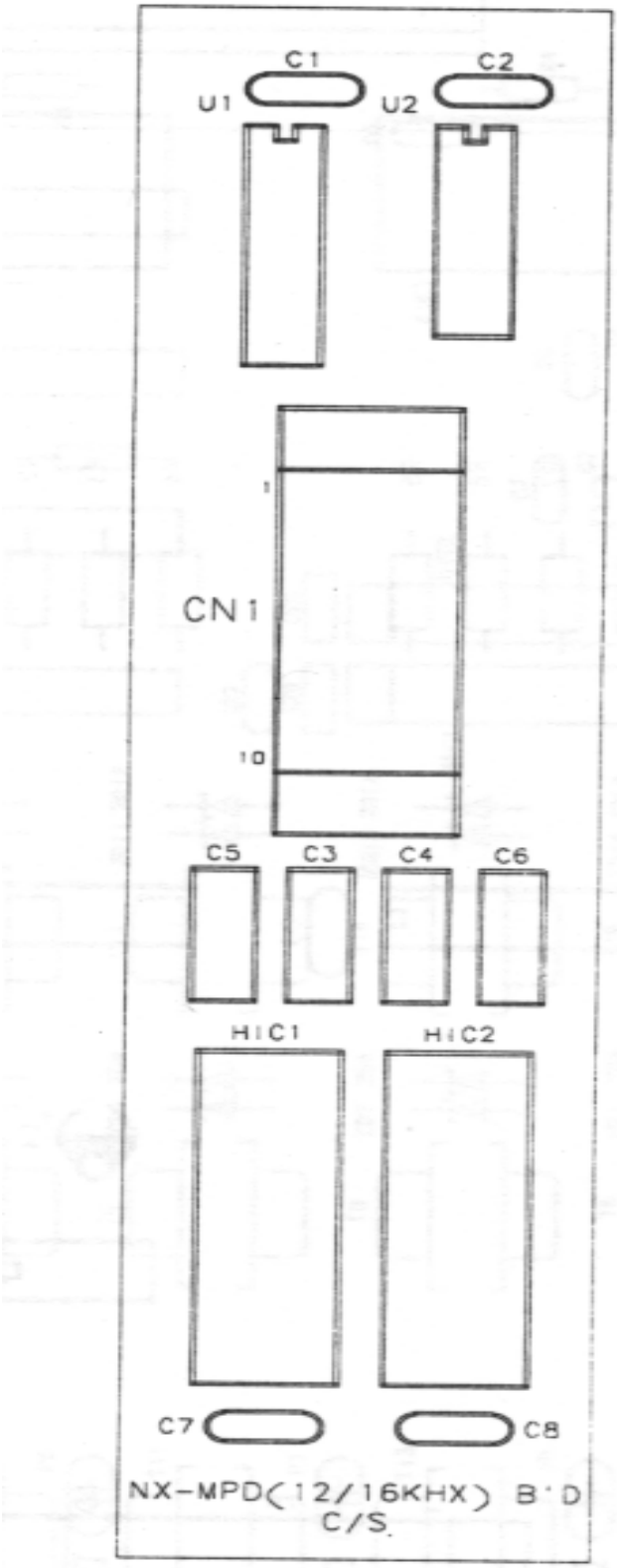
4.11 NX-8KLI EXP B'D



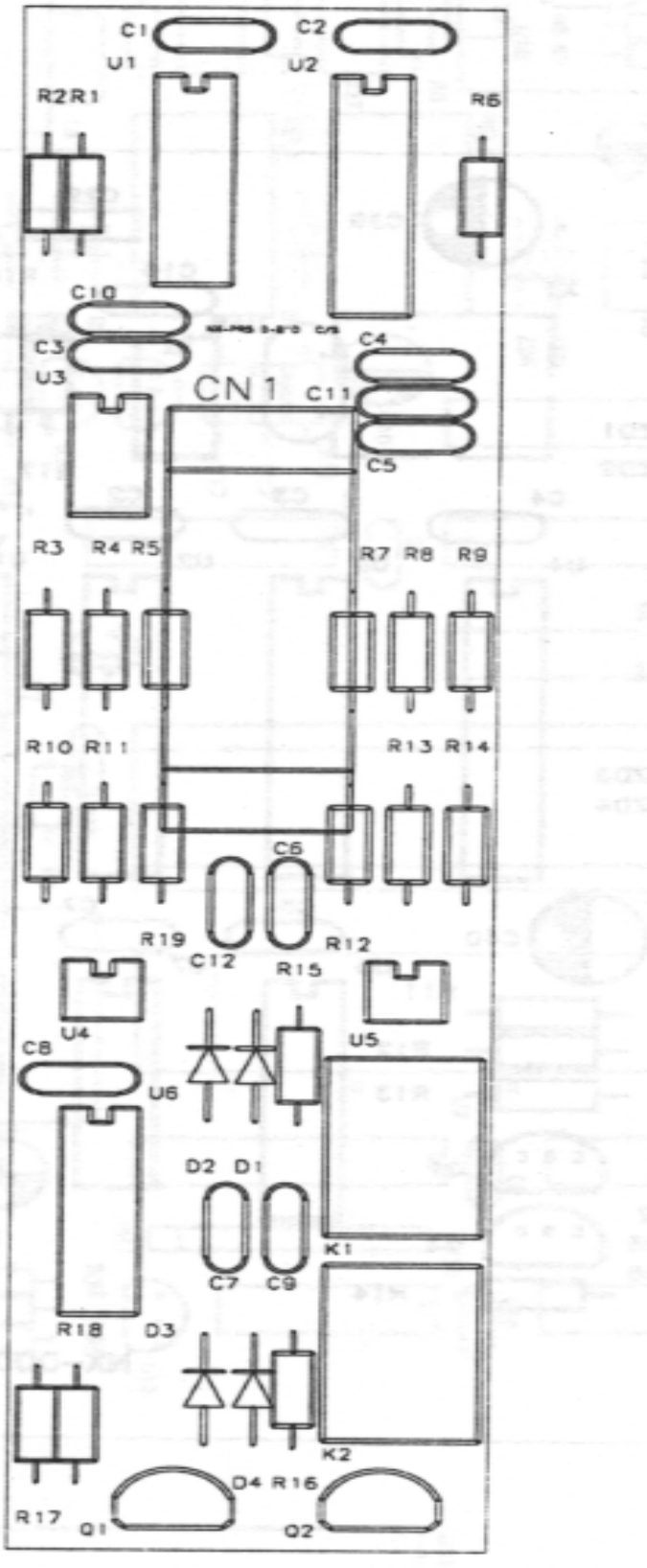
4.12 NX-SMDR / R-MMC B'D



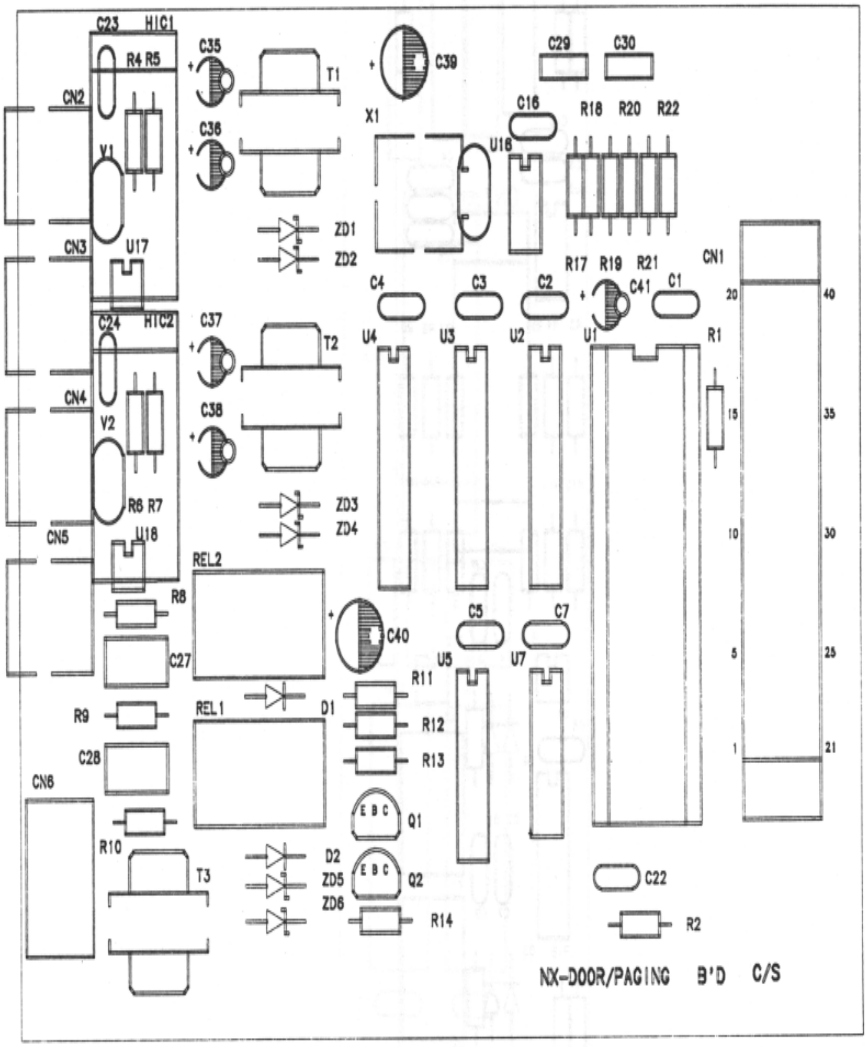
4.13 NX-MPD B'D


C1
C2
U1
U2
1
CN1
10
C5
C3
C4
C6
HIC1
HIC2
C7
C8
NX-MPD(12/16KHX) B'D
C/S

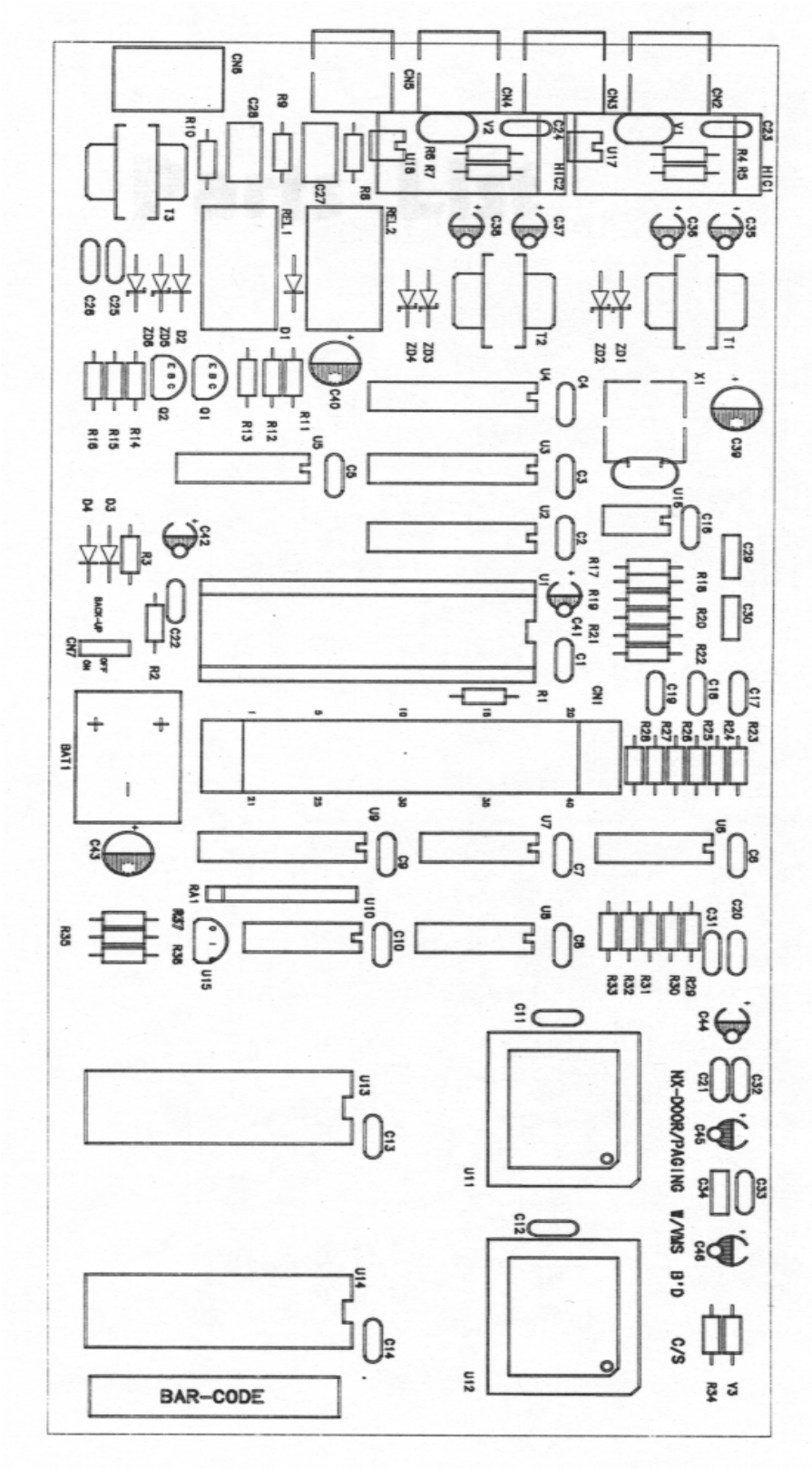
4.14 NX-PRS D-B'D



4.15 NX-DOOR/PAGING D-B'D

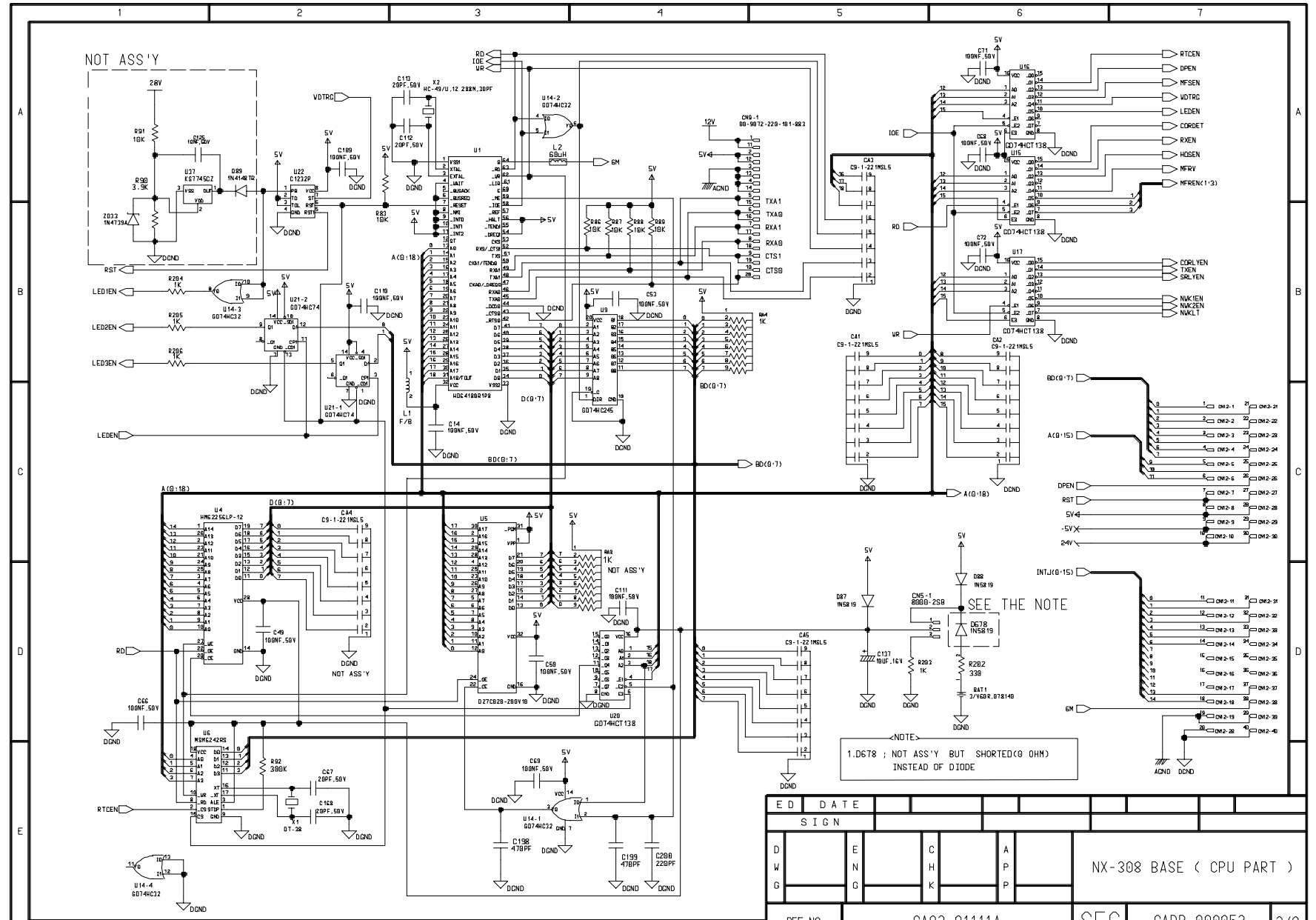


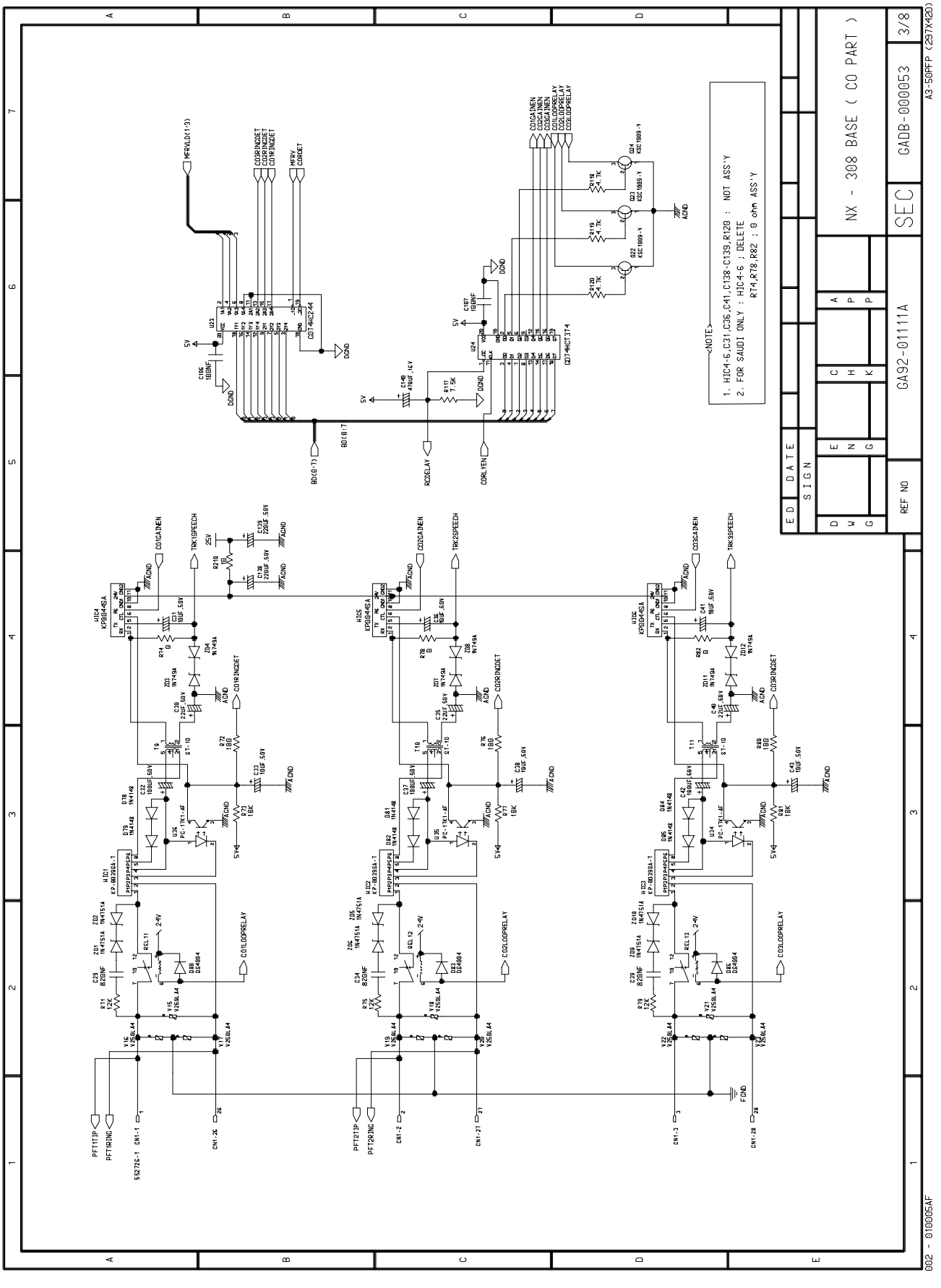
4.16 NX-DOOR/PAGING W/VMS D-B'D



6.CIRCUIT DIAGRAM

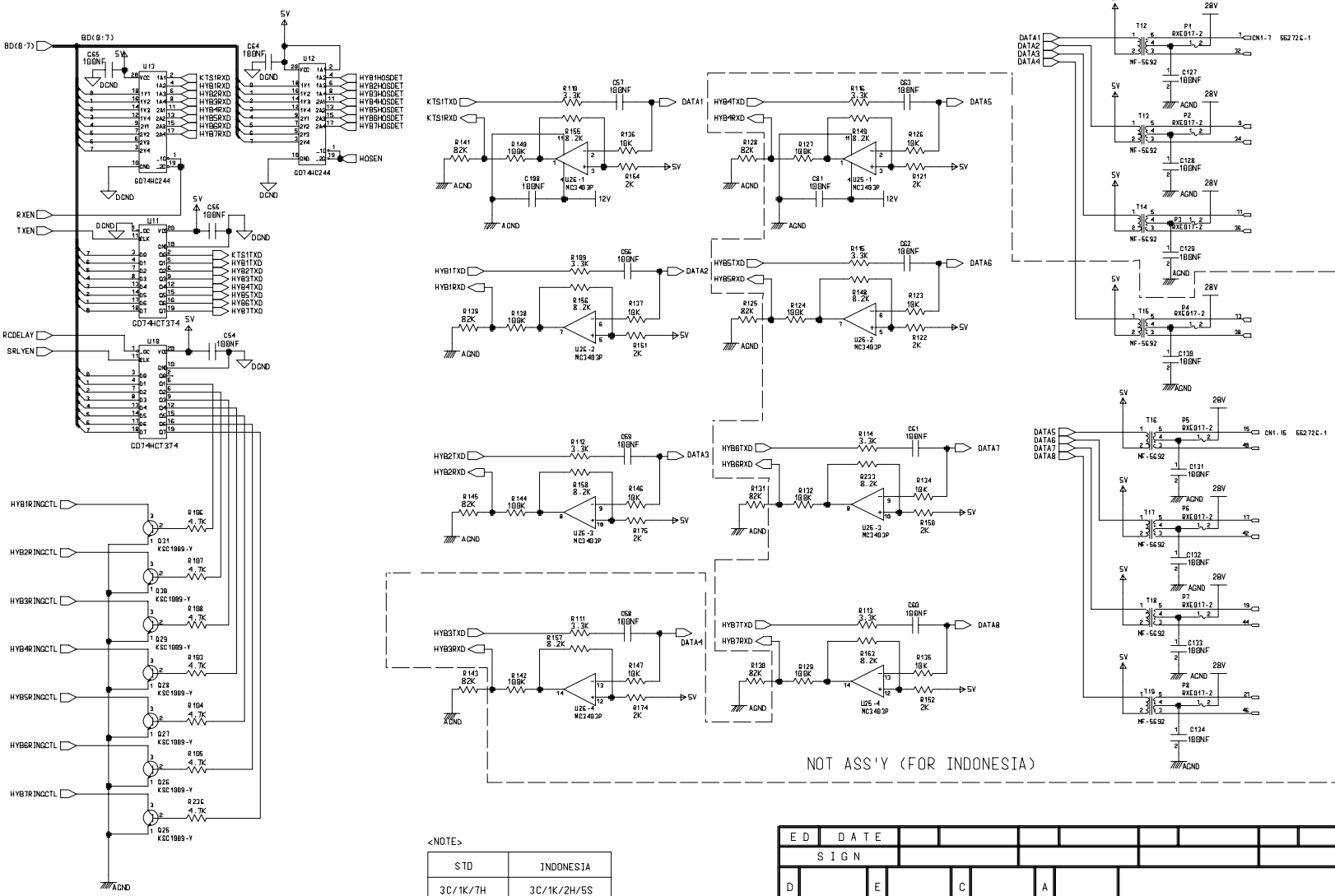
Samsung Electronics Co., Ltd.
All Rights reserved.





Samsung Electronics Co., Ltd.
All Rights reserved.

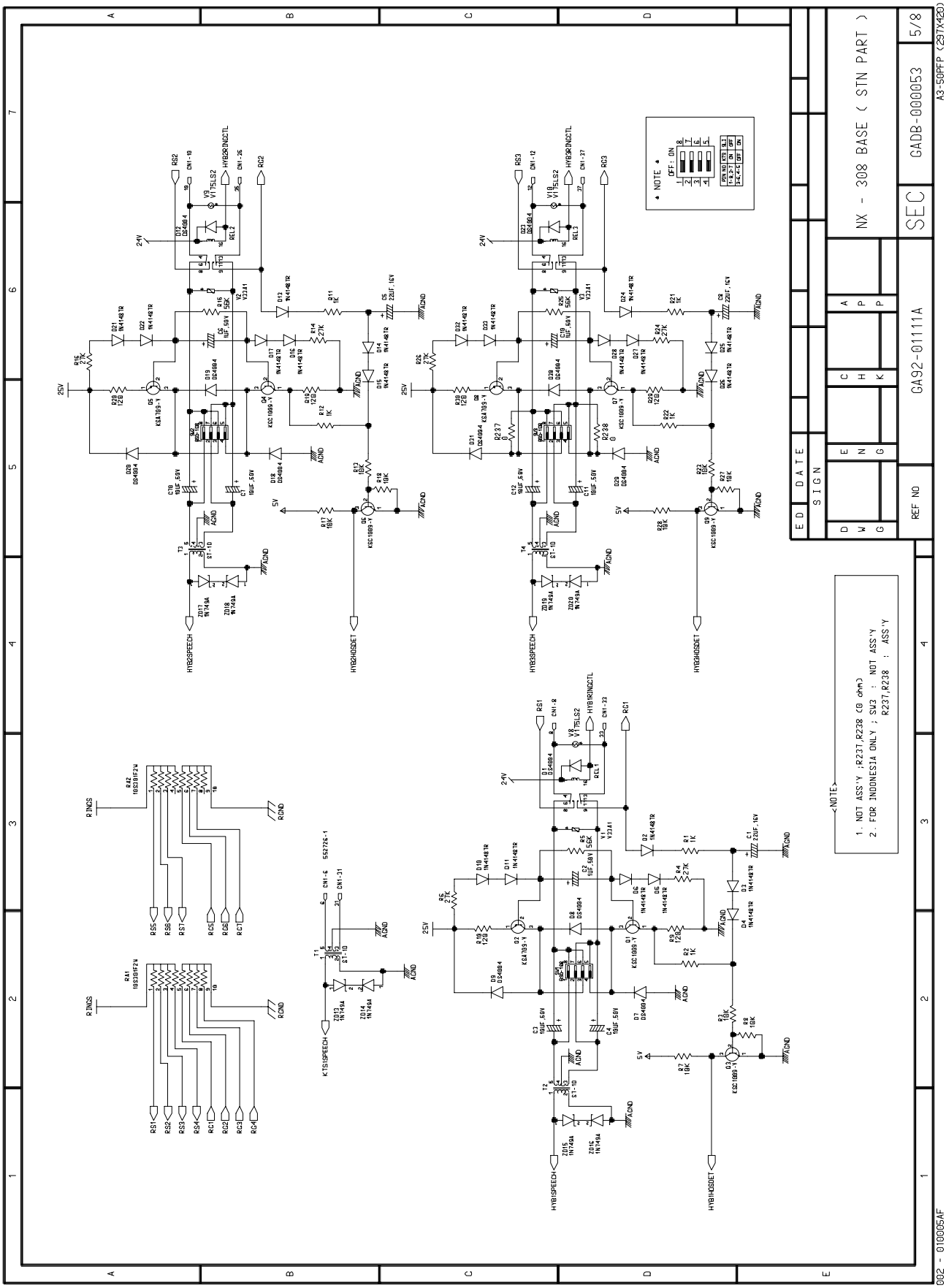
Samsung Electronics Co., Ltd.
All Rights reserved.



<NOTE>

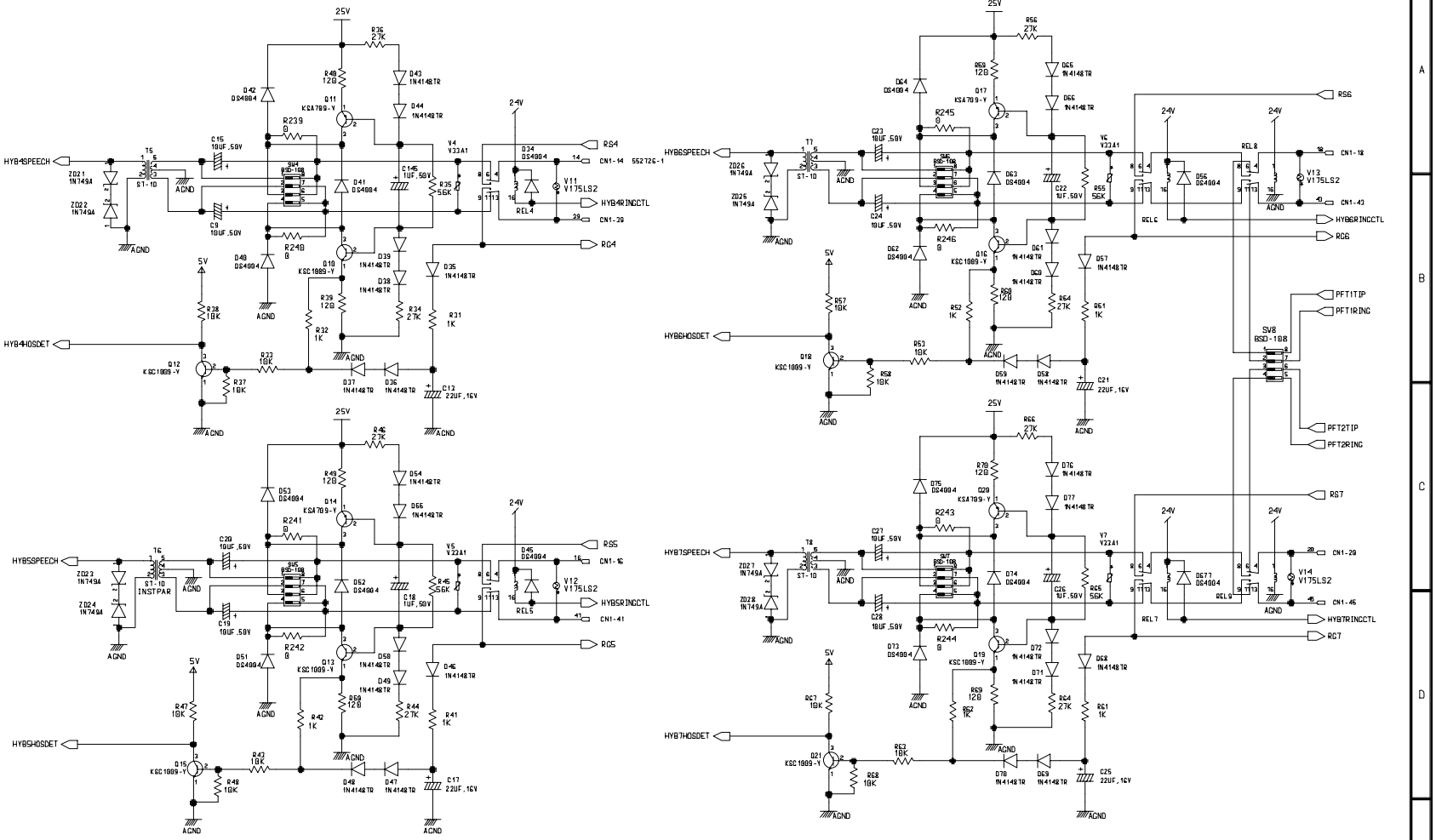
STD	INDONESIA
3C/1K/7H	3C/1K/2H/5S

ED	DATE								
SIGN									
DWG		ENG		CHK		APP		NX - 308 BASE (STN PART)	
REF NO	GA92-01111A						SEC	GADB-000053	4/8



Samsung Electronics Co., Ltd.
All Rights reserved.

Samsung Electronics Co., Ltd.
All Rights reserved.



<NOTE>

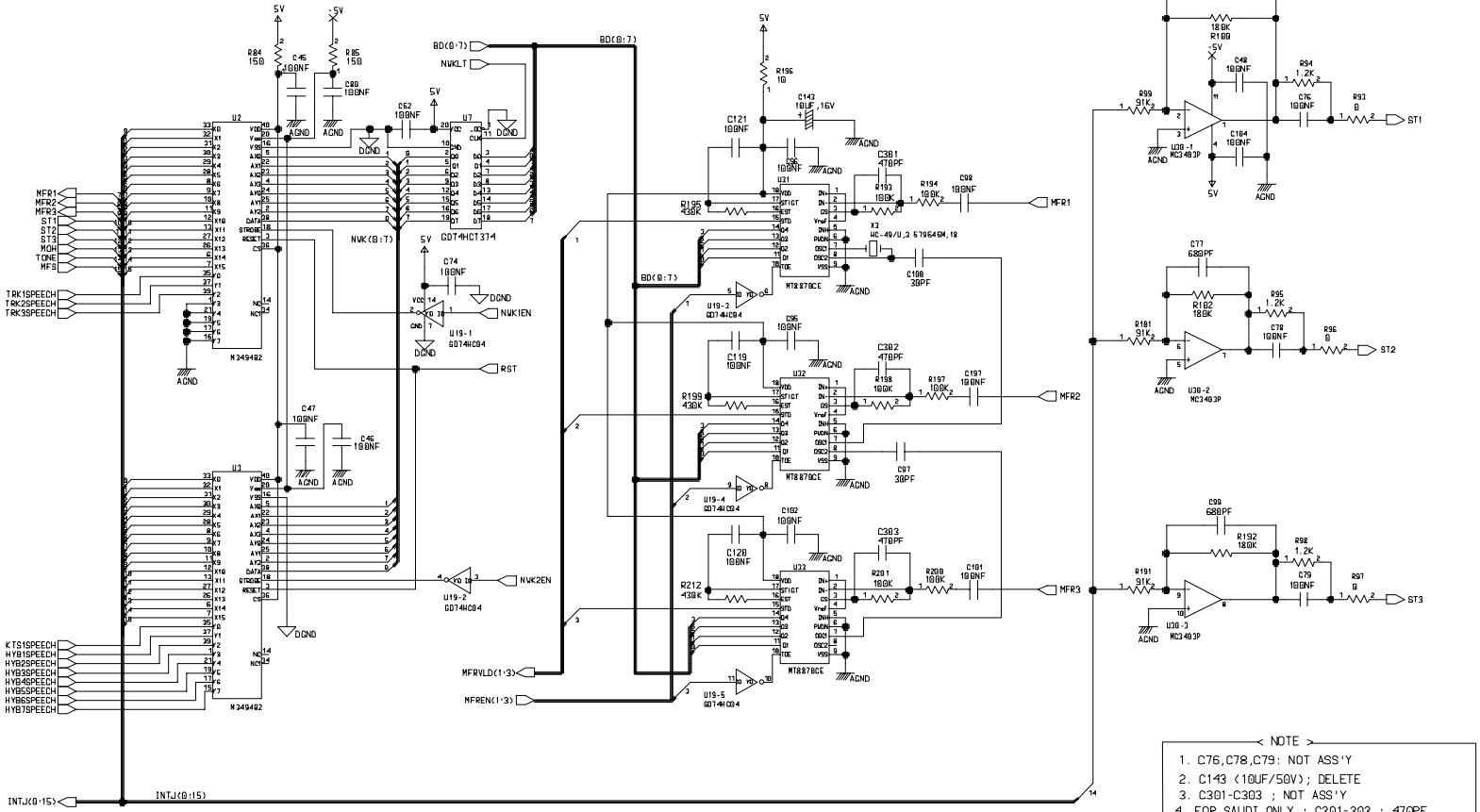
1. NOT ASS'Y ; R239-R246 (0 hom)
2. FOR INDONESIA ONLY ; SW4-7 : NOT ASS'Y
   R239-246 : ASS'Y

ED	DATE							
	SIGN							

DWG		ENG		CHK		APP	NX - 308 BASE (STN PART)

REF NO	GA92-01111A	SEC	GADB-000053	6/8

Samsung Electronics Co., Ltd.
All Rights reserved.



< NOTE >

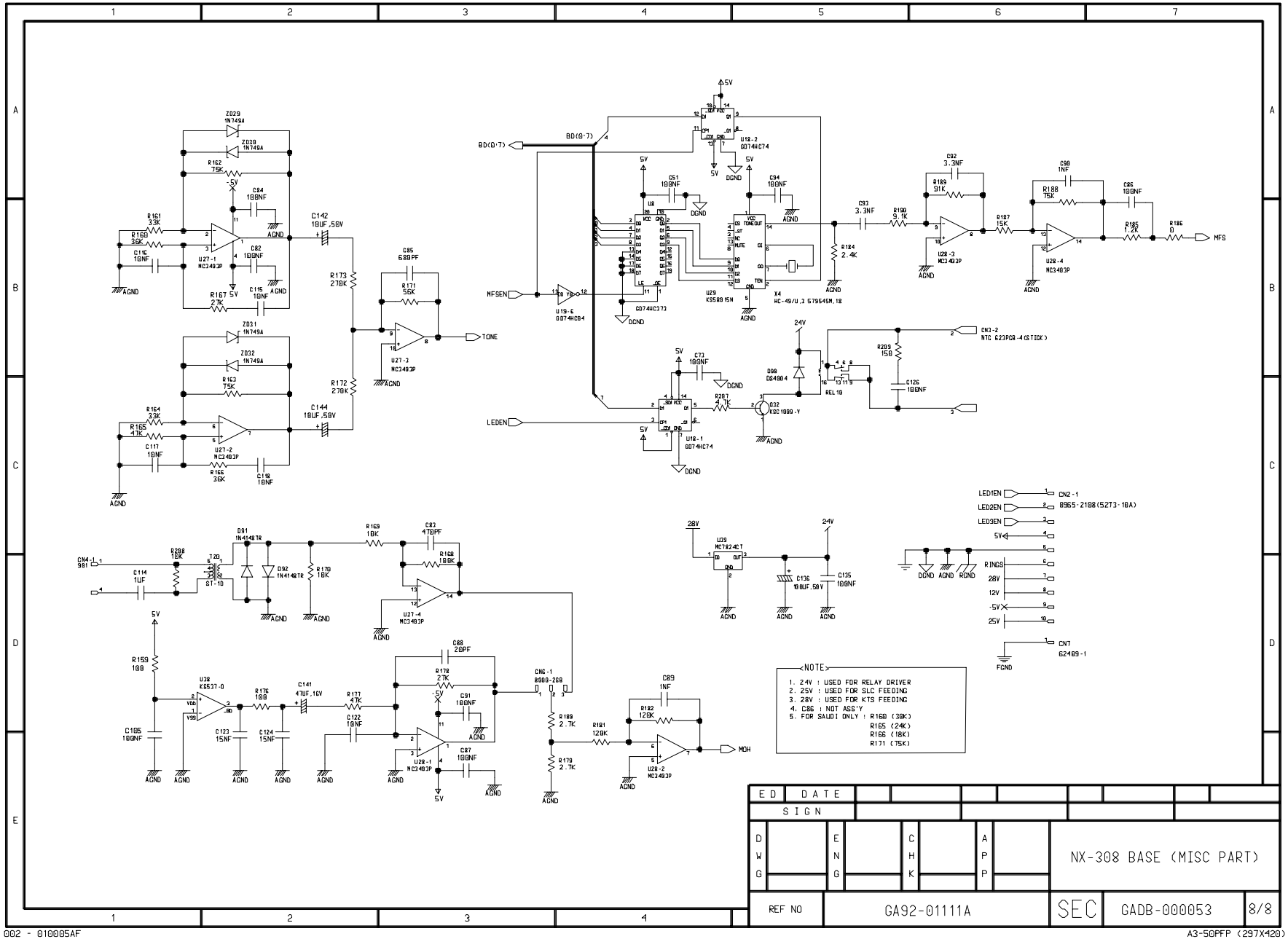
1. C76,C78,C79: NOT ASS'Y
2. C143 (10UF/50V); DELETE
3. C301-C303 ; NOT ASS'Y
4. FOR SAUDI ONLY : C301-303 ; 470PF
   R194,R197,R200 ; 47K
   R99,R101,R191 ; 39K
   R94,R95,R98 ; 7.5K

ED	DATE							
SIGN								

DWG		ENG		CHK		APP		NX - 308 BASE (NWK PART)

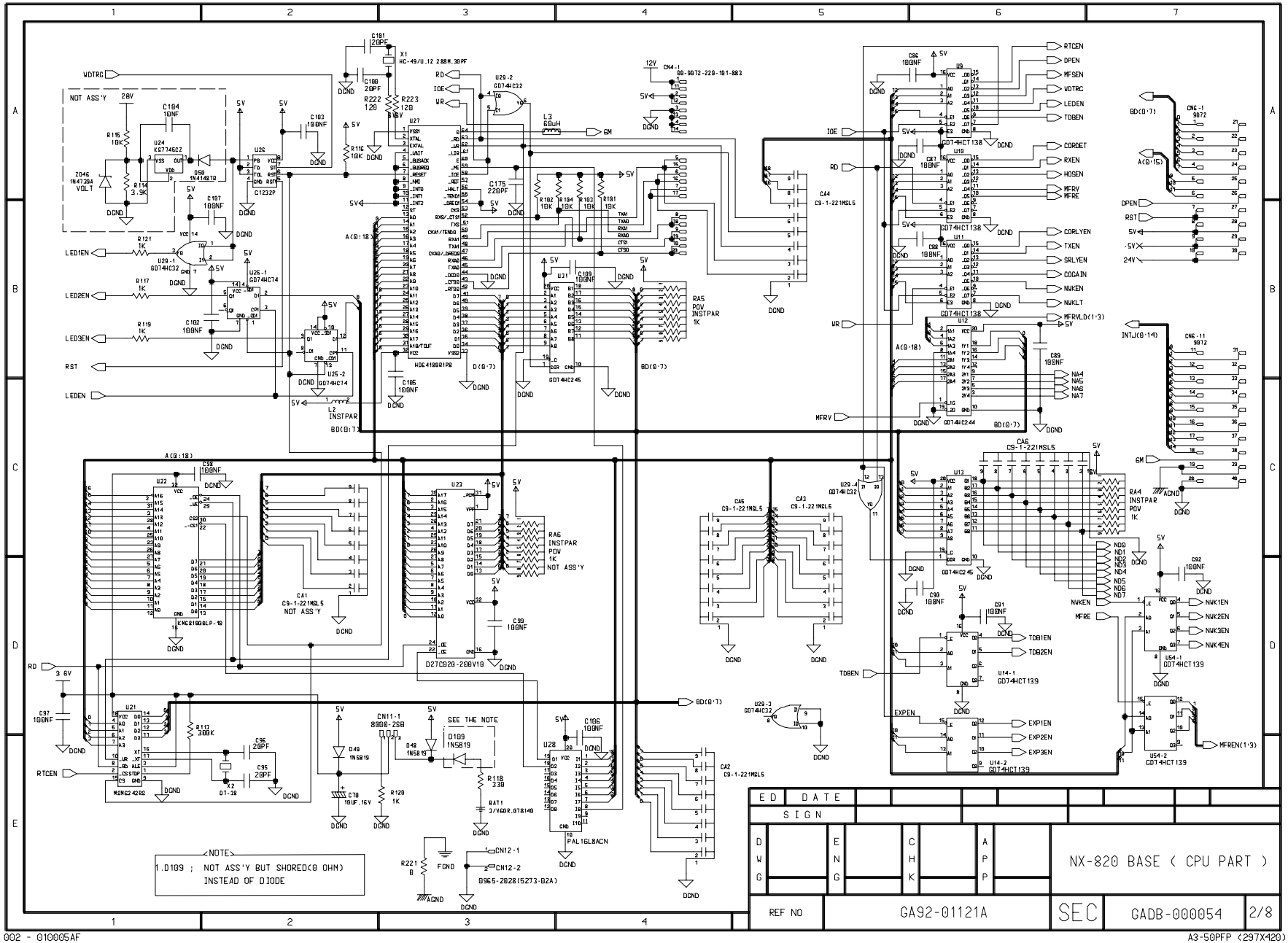
REF NO	GA92-01111A	SEC	GADB-000053	7/8

Samsung Electronics Co., Ltd.
All Rights reserved.

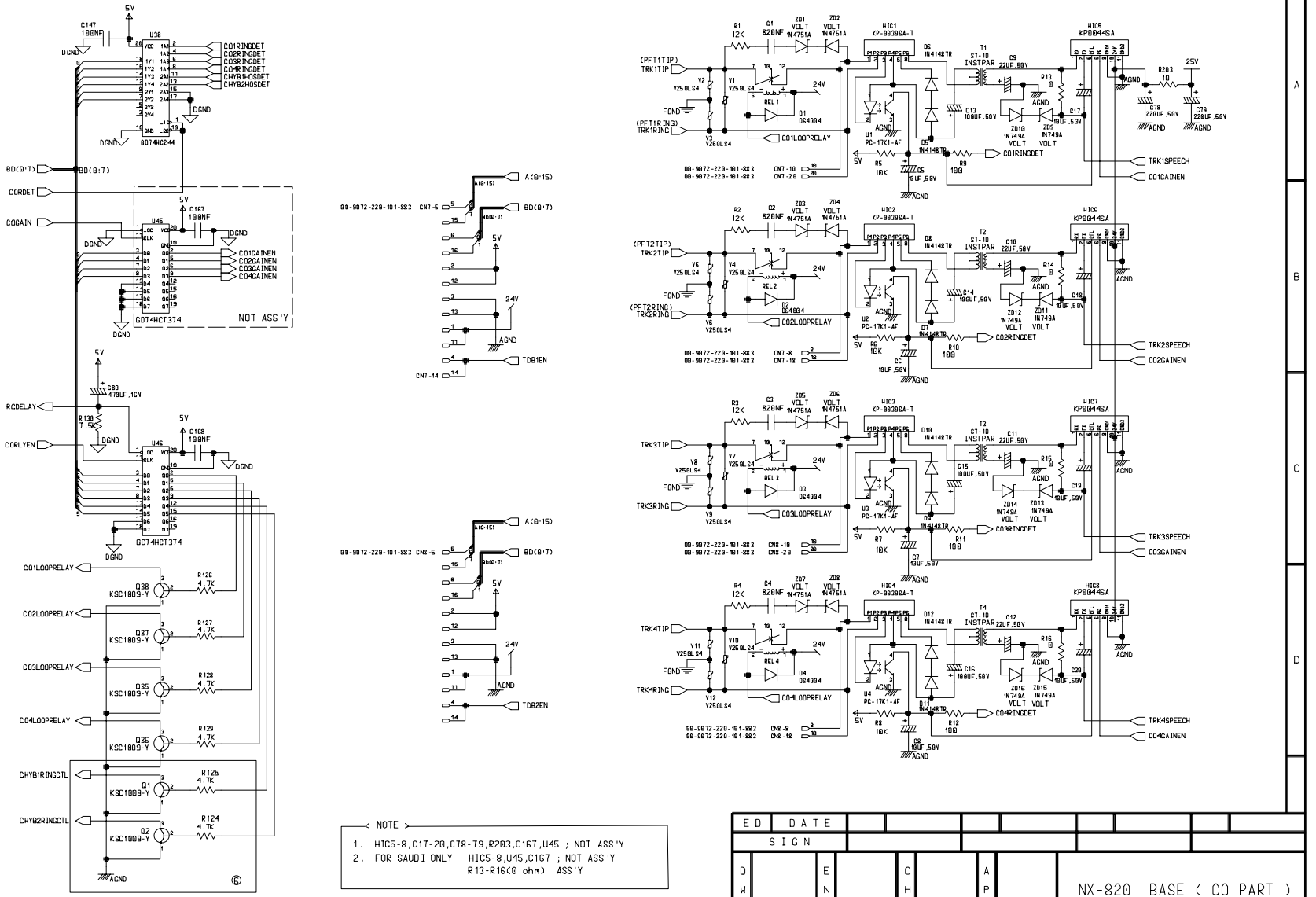


ED	DATE								
SIGN									
DWG		ENG		CHK		APP		NX-308 BASE (MISC PART)	
REF NO	GA92-01111A						SEC	GADB-000053	8/8

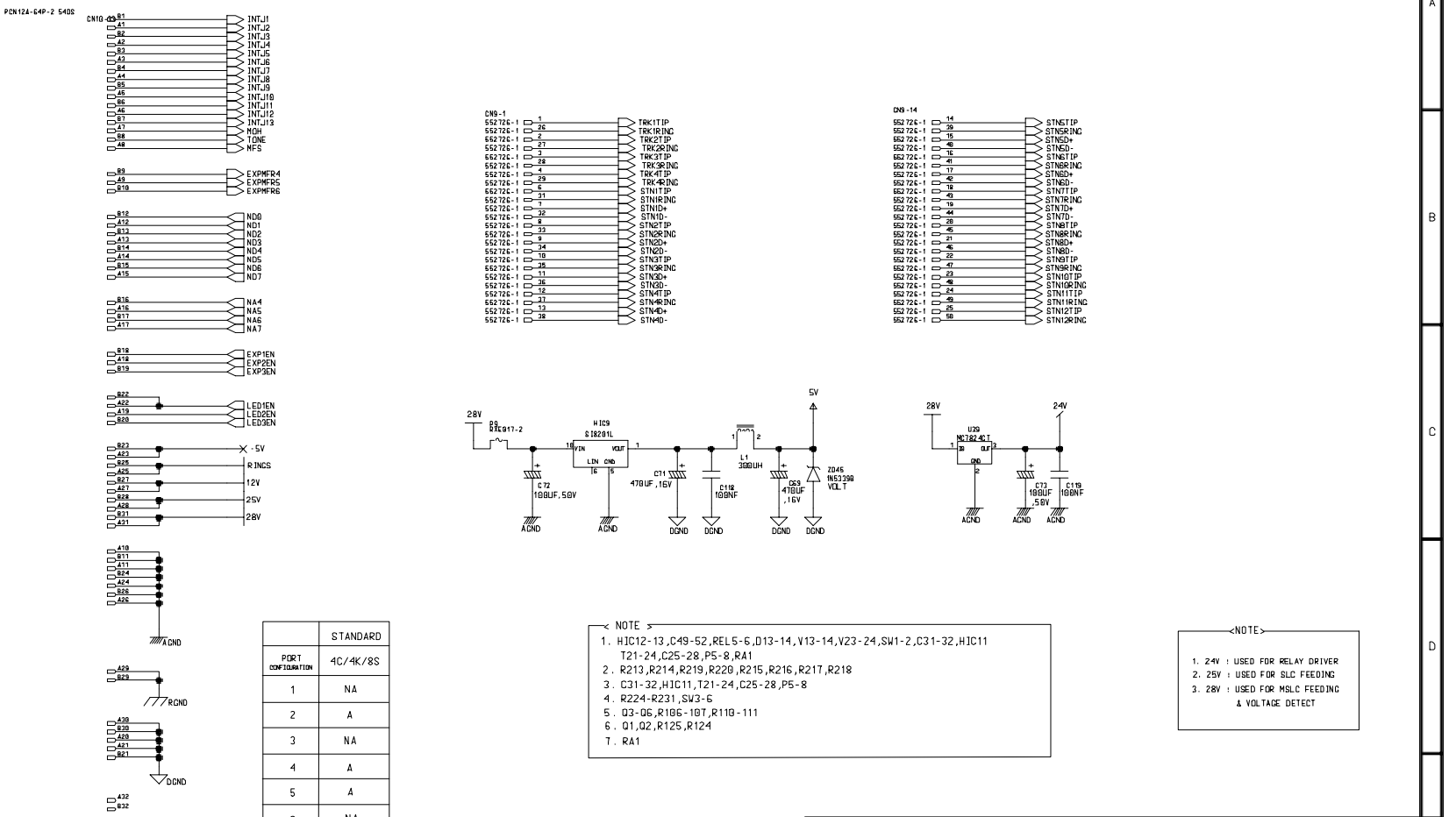
Samsung Electronics Co., Ltd.
All Rights reserved.



Samsung Electronics Co., Ltd.
All Rights reserved.



Samsung Electronics Co., Ltd.
All Rights reserved.



	STANDARD
PORT CONFIGURATION	4C/4K/8S
1	NA
2	A
3	NA
4	A
5	A
6	NA
7	NA

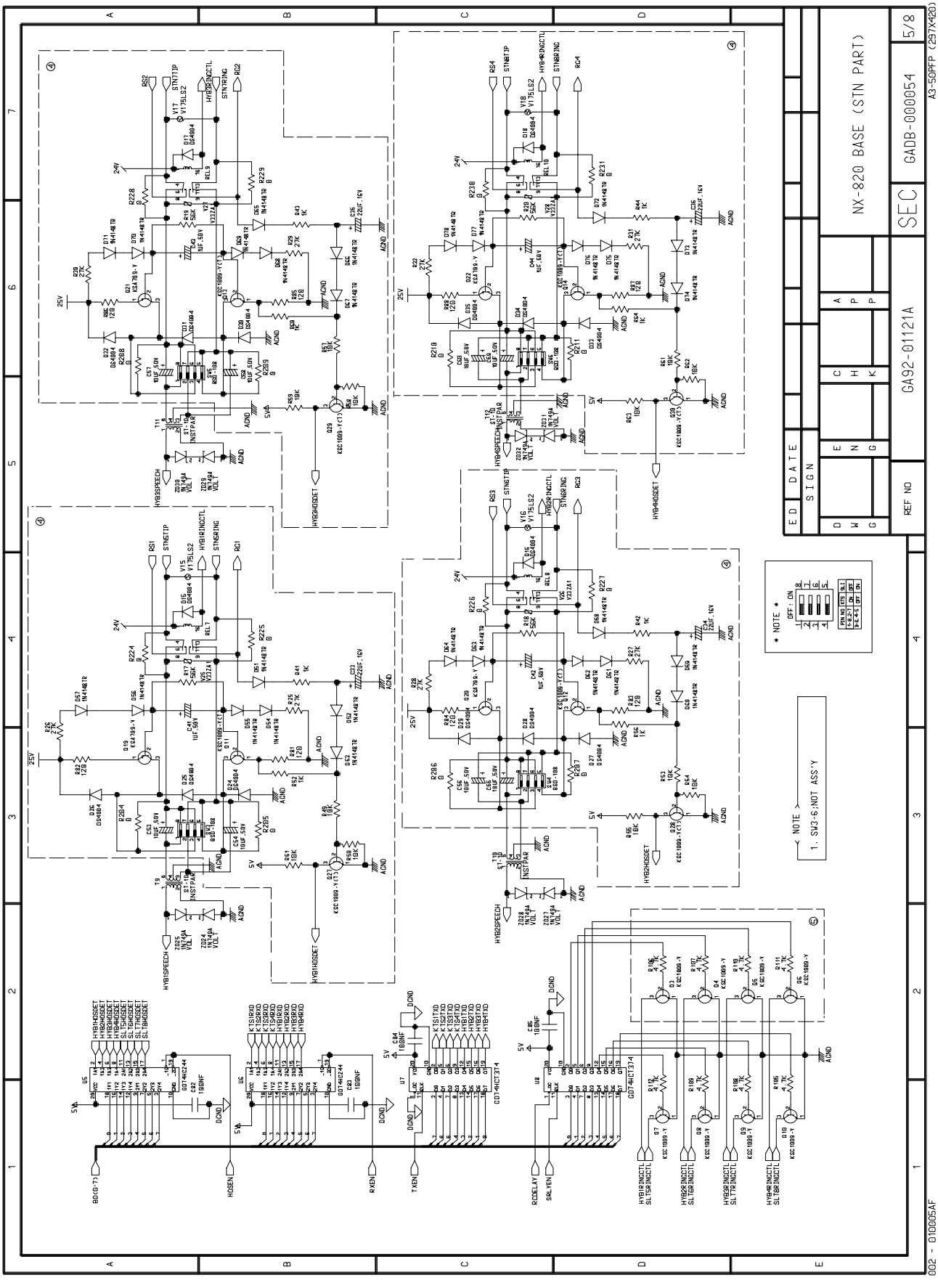
* . NA : NOT ASS'Y
* . A : ASS'Y

< NOTE >
1. HIC12-13,C49-52,REL5-6,D13-14,V13-14,V23-24,SW1-2,C31-32,HIC11
   T21-24,C25-28,P5-8,RA1
2. R213,R214,R219,R220,R215,R216,R217,R218
3. C31-32,HIC11,T21-24,C25-28,P5-8
4. R224-R231,SW3-6
5. Q3-Q5,R106-107,R110-111
6. Q1,Q2,R125,R124
7. RA1

<NOTE>
1. 24V : USED FOR RELAY DRIVER
2. 25V : USED FOR SLC FEEDING
3. 28V : USED FOR MSLC FEEDING
   & VOLTAGE DETECT

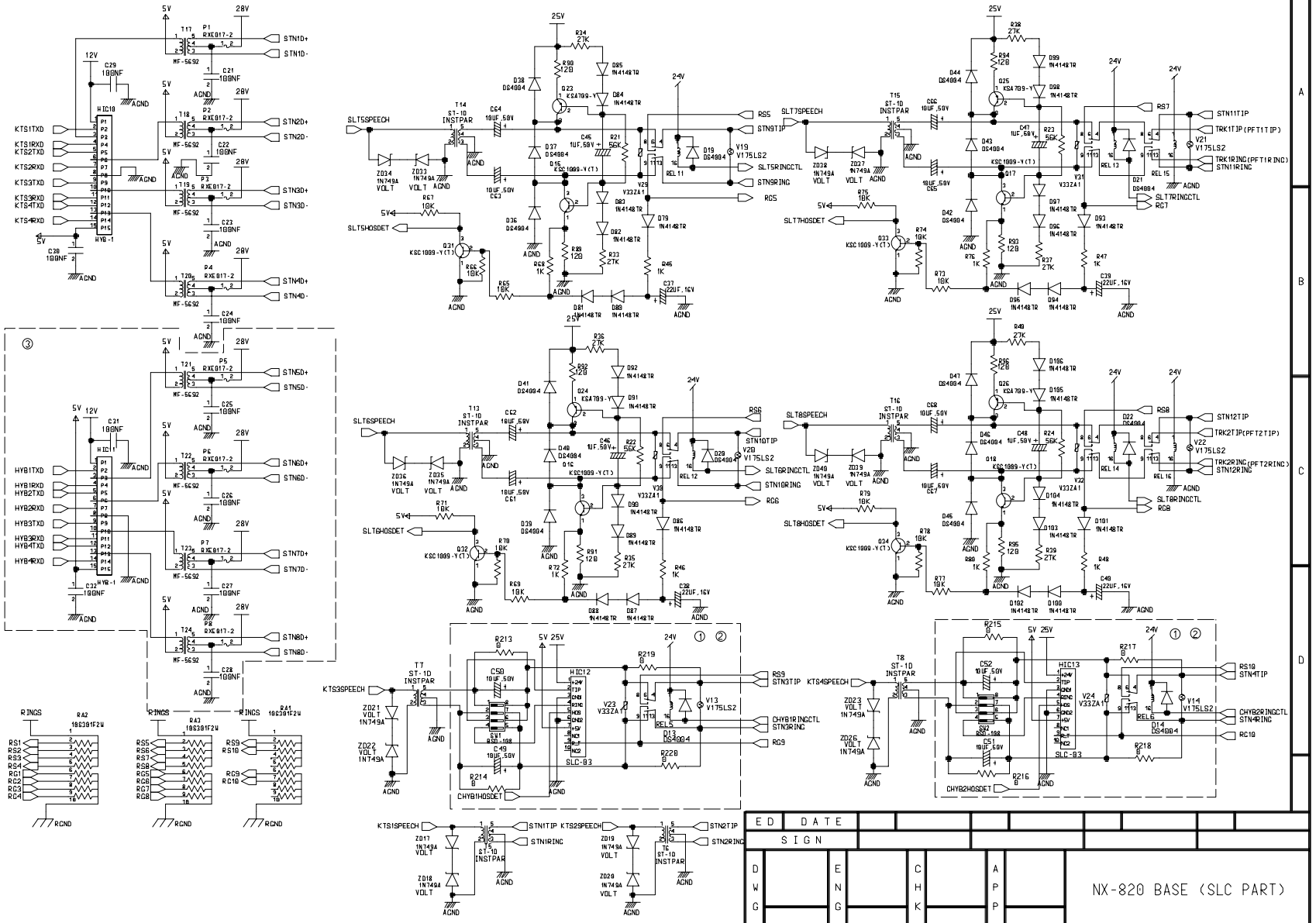
ED	DATE	04	98.01.14						
SIGN									

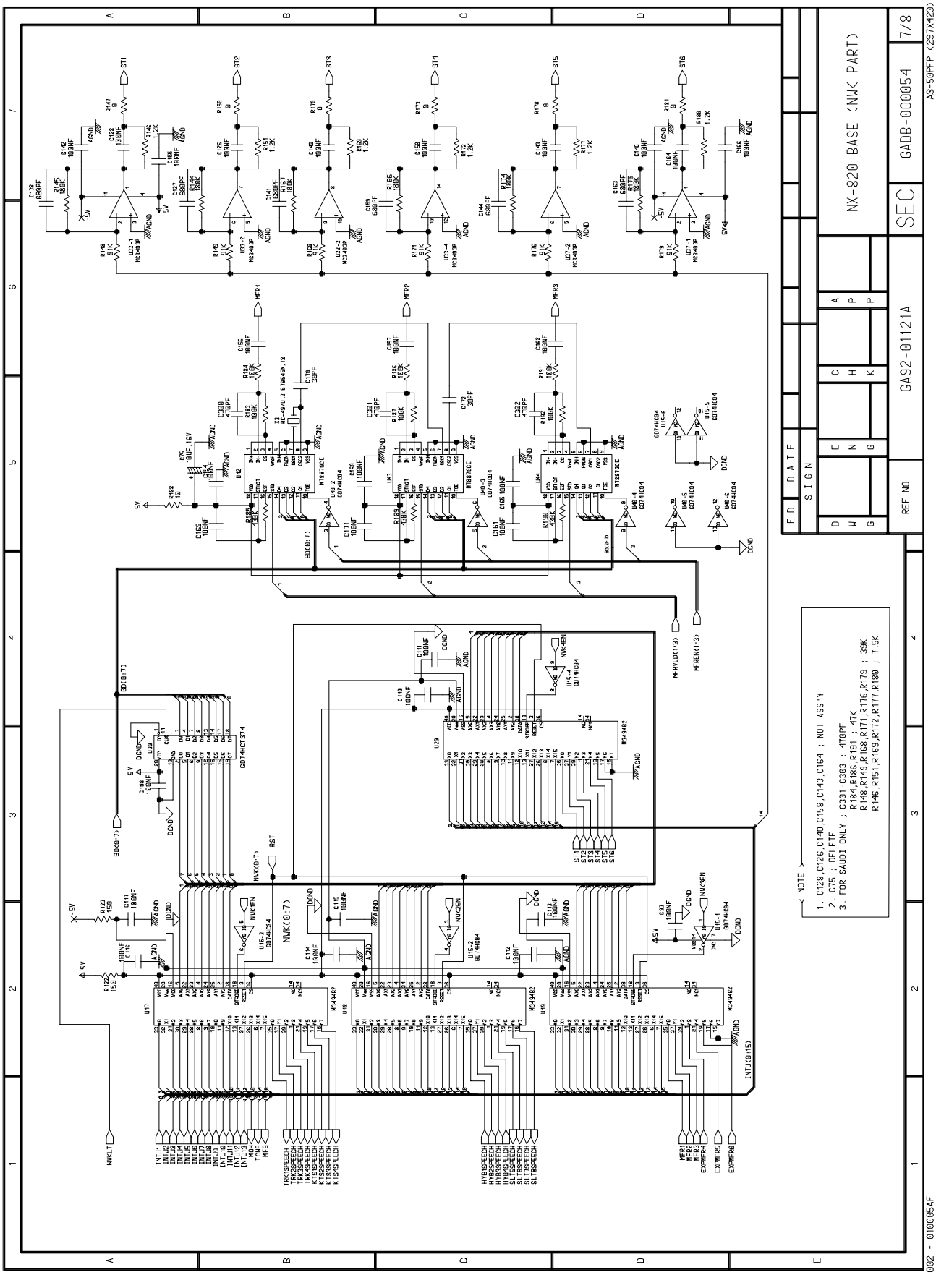
DWG		ENG		CHK		APP		NX-820 BASE (CON. PART)		
REF NO	GA92-01121A							SEC	GADB-000054	4/8



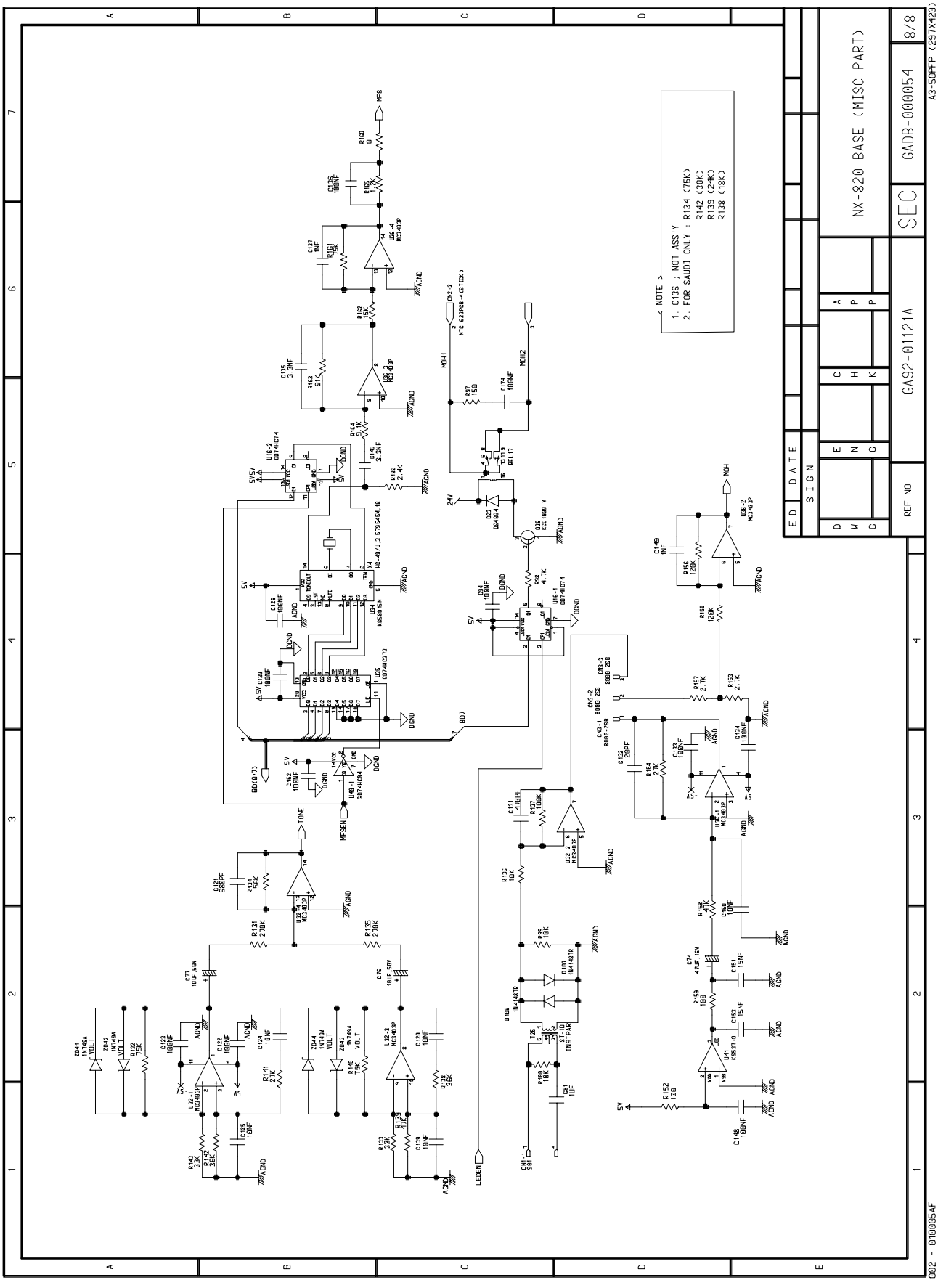
Samsung Electronics Co., Ltd.
All Rights reserved.

Samsung Electronics Co., Ltd.
All Rights reserved.

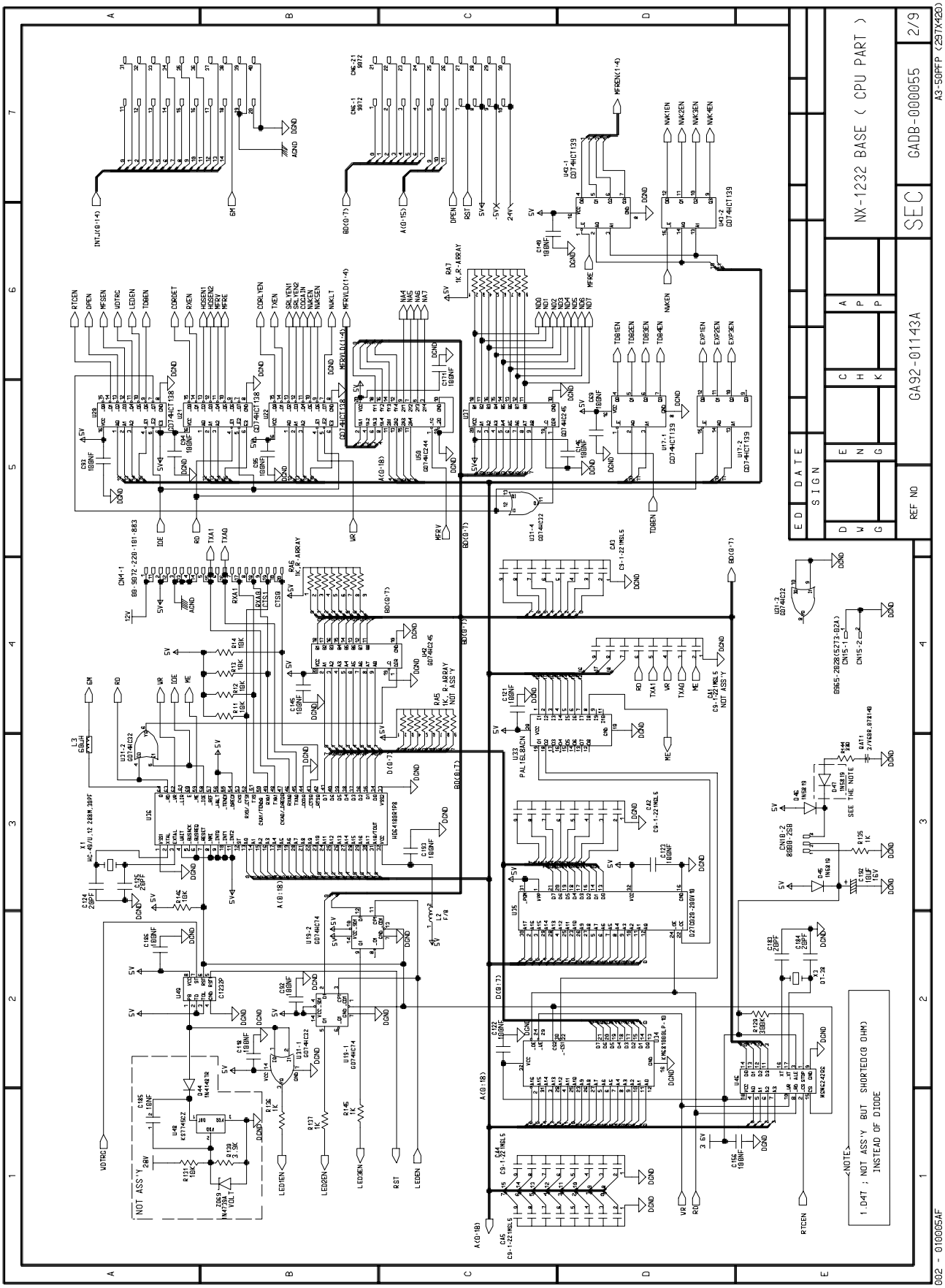




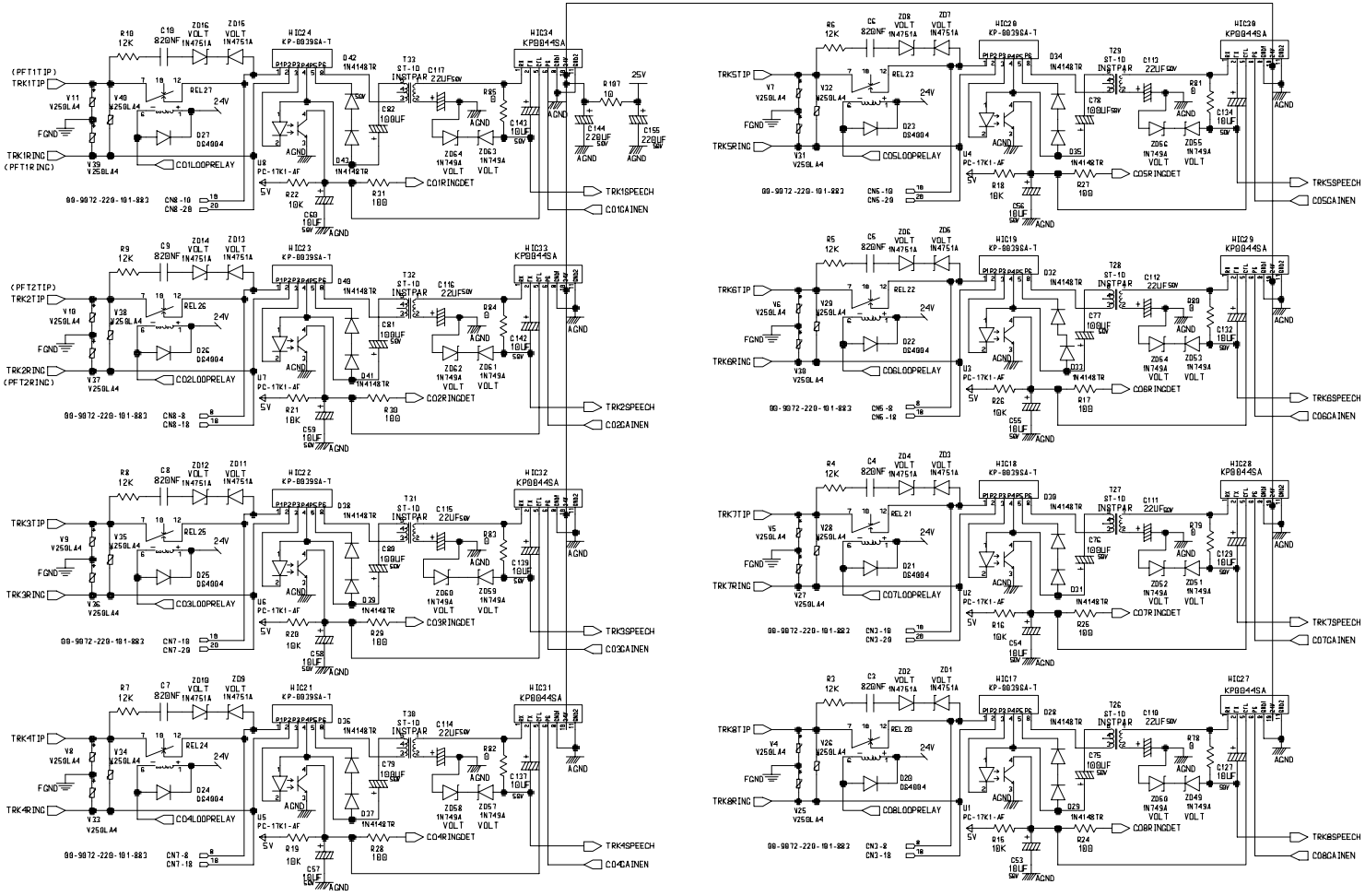
Samsung Electronics Co., Ltd.
All Rights reserved.



Samsung Electronics Co., Ltd.
All Rights reserved.


NX-1232 BASE (CPU PART)
SEC
CADB-000055
2/9
GA92-01143A
REF NO
D W G
E N G
C H K
A P P
E D
DATE
SIGN
A3-SOFFP (297X420)
002 - 010005AF
<NOTE>
1.D47 ; NOT ASS'Y BUT SHORTED(0 OHM)
INSTEAD OF DIODE
NOT ASS'Y

Samsung Electronics Co., Ltd.
All Rights reserved.

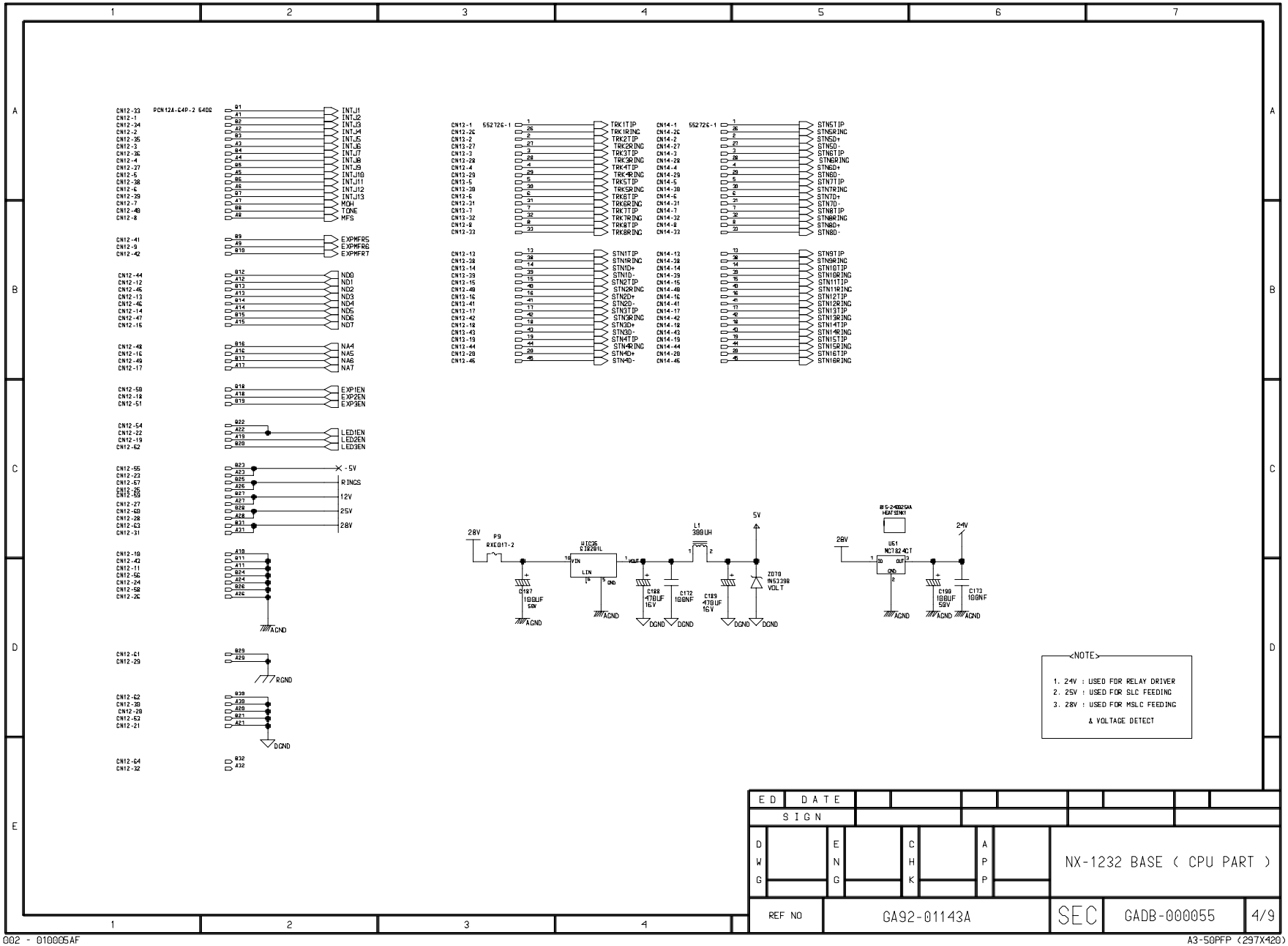


NOTE

1. HIC27-34,C127,C129,C132,C134,C137,C139,C142-145,R107 ; NOT ASS'Y
2. FOR SAUDI ONLY : HIC17-20,HIC31-34 ; NOT ASS'Y
   RT8-85 (0 ohm) ; ASS'Y
   R107(10 ohm), C144,C155(220UF,50V) ; NOT ASS'Y

E D	D A T E							
S I G N								
D W G		E N G		C H K		A P P		NX-1232 BASE (CO PART)
REF NO	GA92-01143A			SEC	GADB-000055			3/9

Samsung Electronics Co., Ltd.
All Rights reserved.



<NOTE>

1. 24V : USED FOR RELAY DRIVER
2. 25V : USED FOR SLC FEEDING
3. 28V : USED FOR MSLC FEEDING

& VOLTAGE DETECT

ED	DATE							
SIGN								

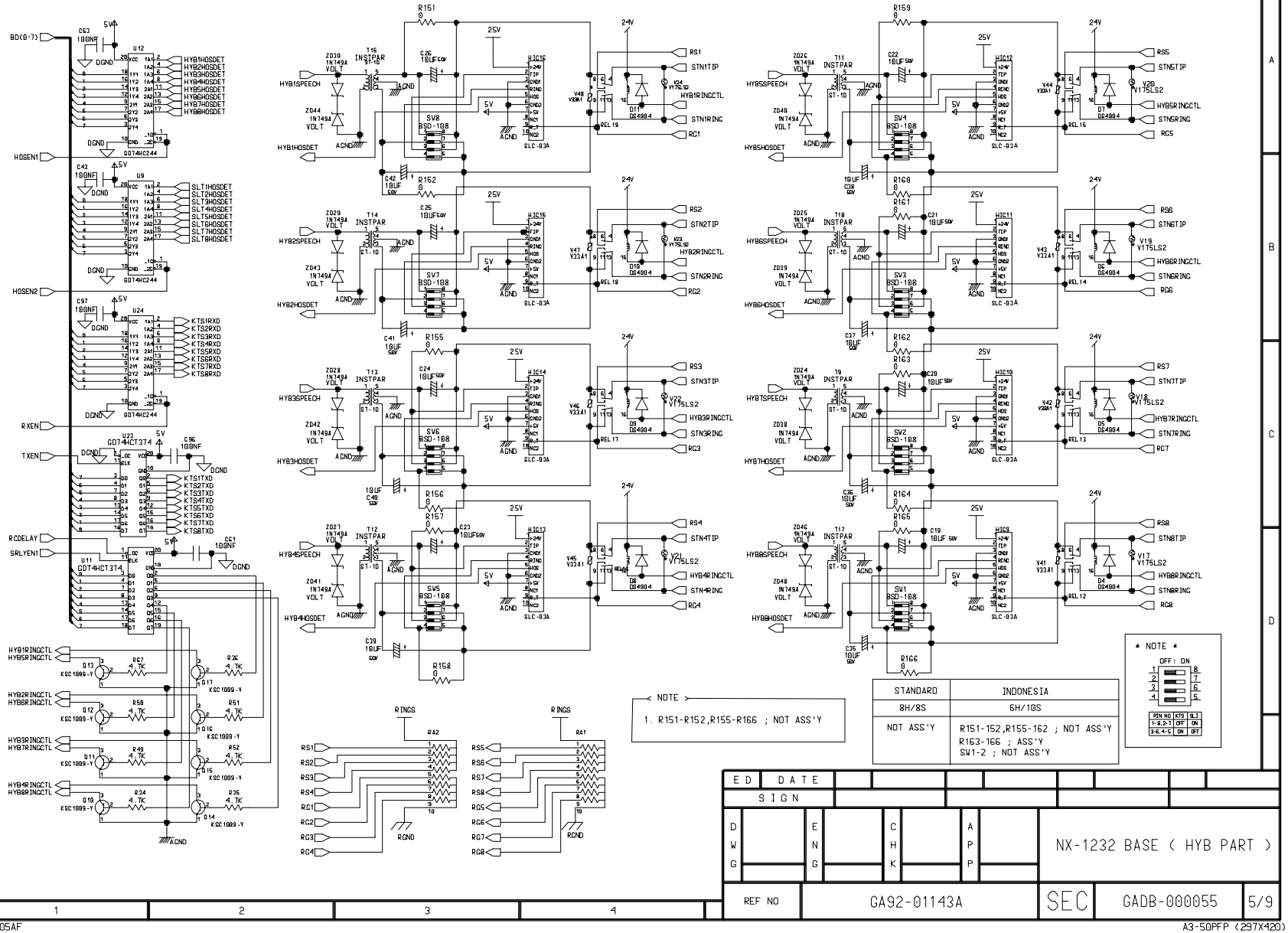
DWG		ENG		CHK		APP		NX-1232 BASE (CPU PART)

REF NO	GA92-01143A	SEC	GADB-000055	4/9

002 - 010005AF

A3-50PFP (297X420)

Samsung Electronics Co., Ltd.
All Rights reserved.



NOTE

1. R151-R152,R155-R166 ; NOT ASS'Y

STANDARD	INDONESIA
8H/8S	6H/10S
NOT ASS'Y	R151-152,R155-162 ; NOT ASS'Y R163-166 ; ASS'Y SW1-2 ; NOT ASS'Y

* NOTE *

OFF : ON

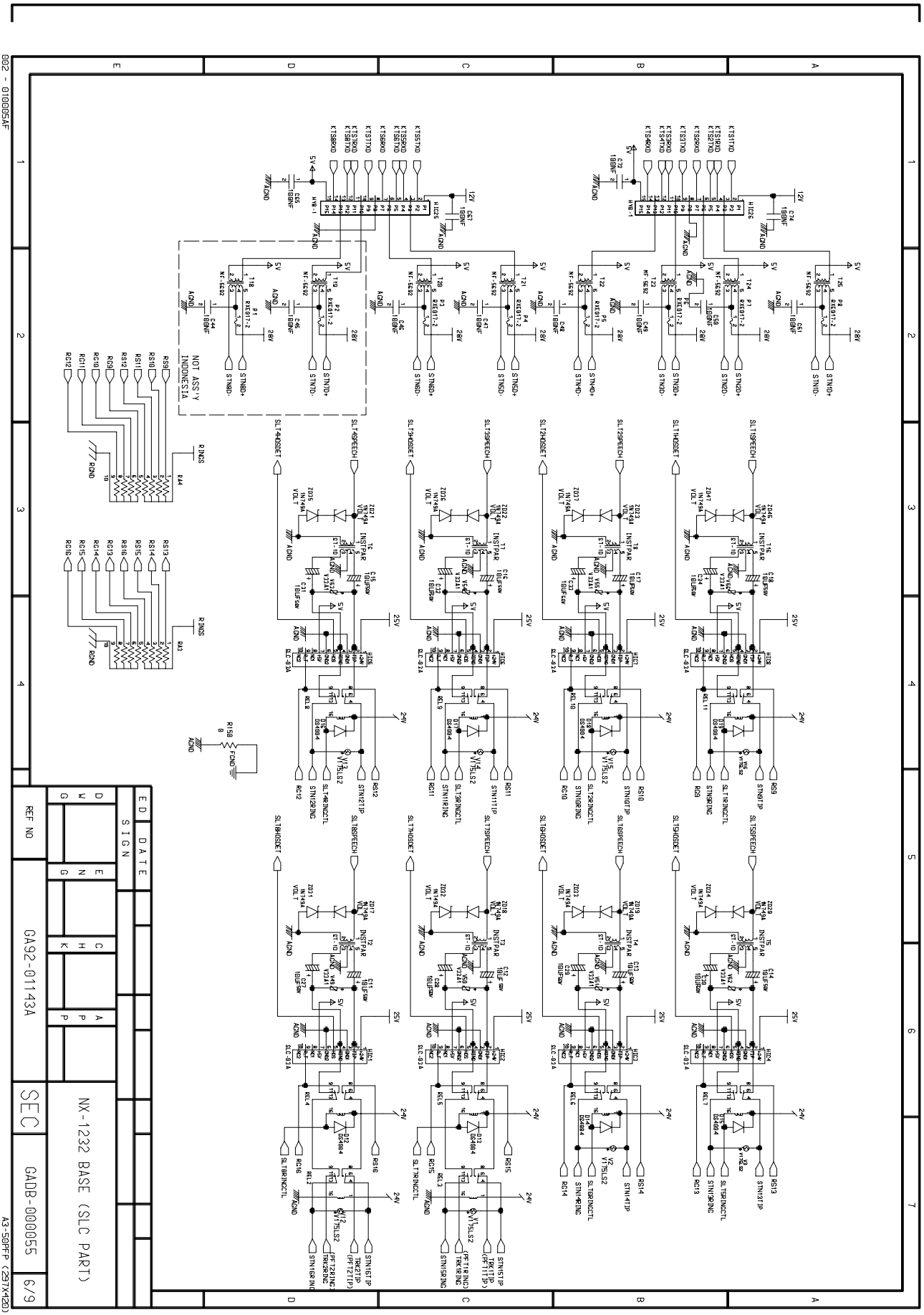
PIN NO	KTS	SLT
1-8,2-7	OFF	ON
3-6,4-5	ON	OFF

ED	DATE						
	SIGN						
DWG		ENG		CHK		APP	NX-1232 BASE (HYB PART)
REF NO	GA92-01143A			SEC	GADB-000055		5/9

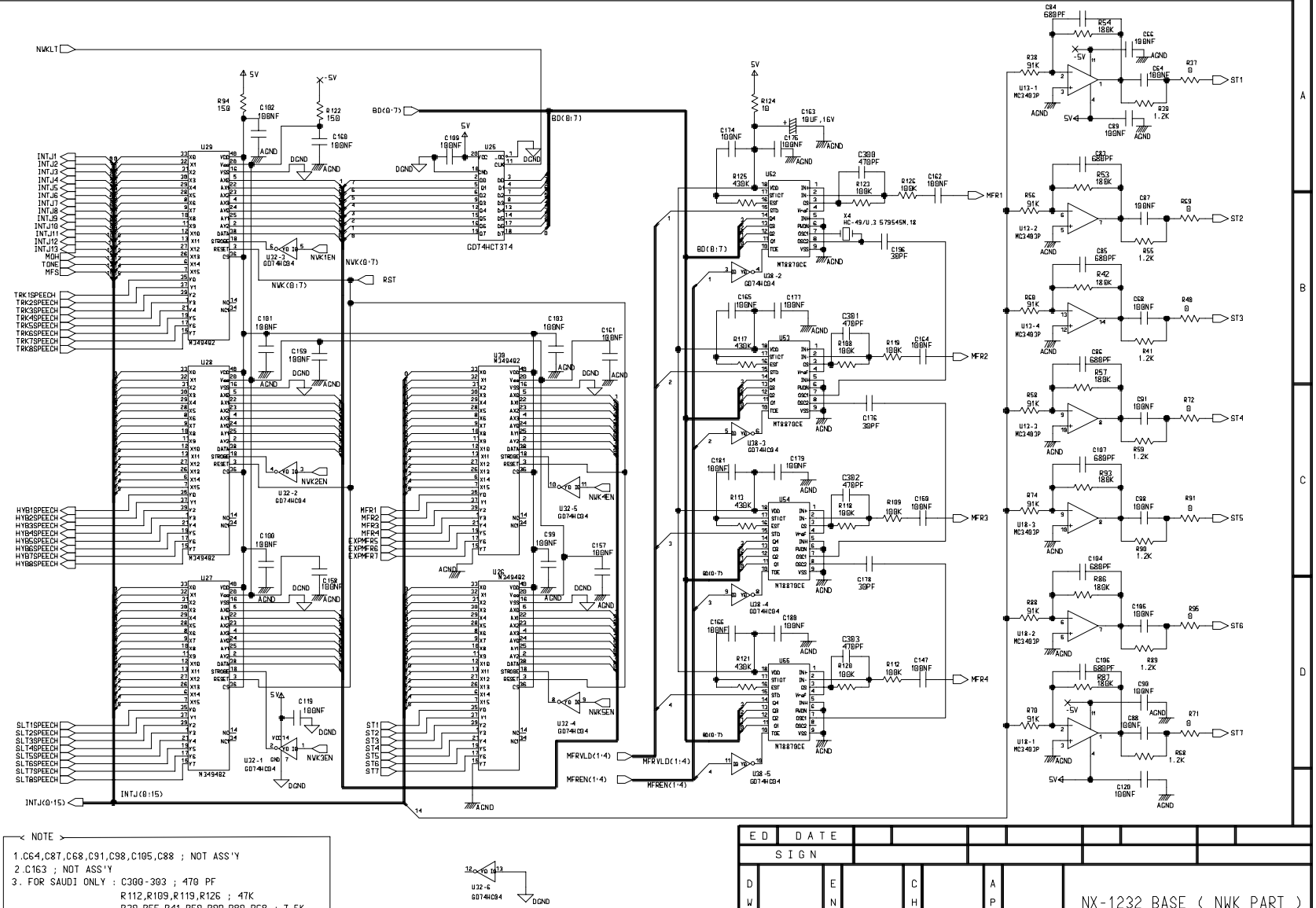
002 - 010005AF

A3-50PFP (297X420)

Samsung Electronics Co., Ltd.
All Rights reserved.



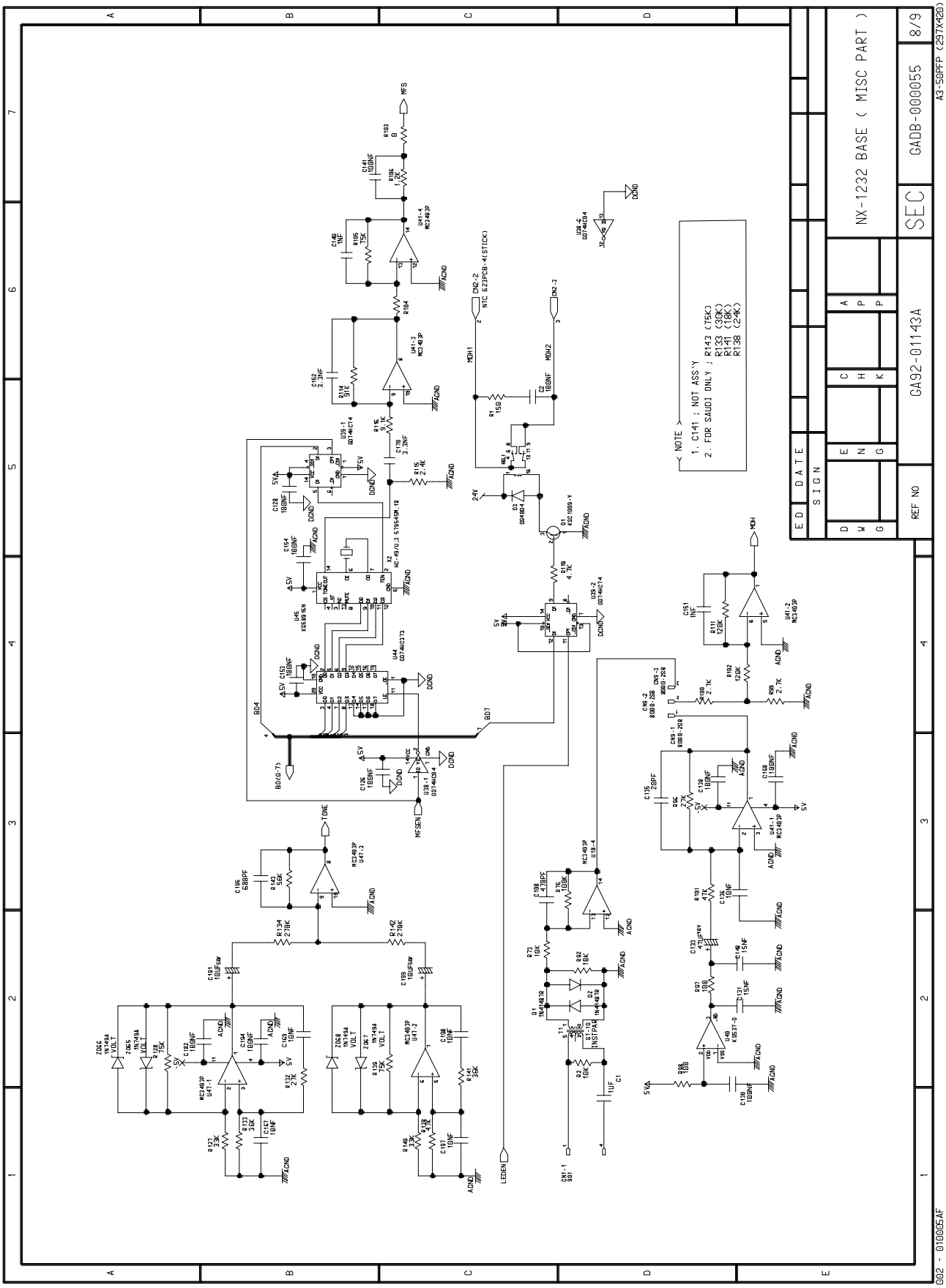
Samsung Electronics Co., Ltd.
All Rights reserved.



NOTE

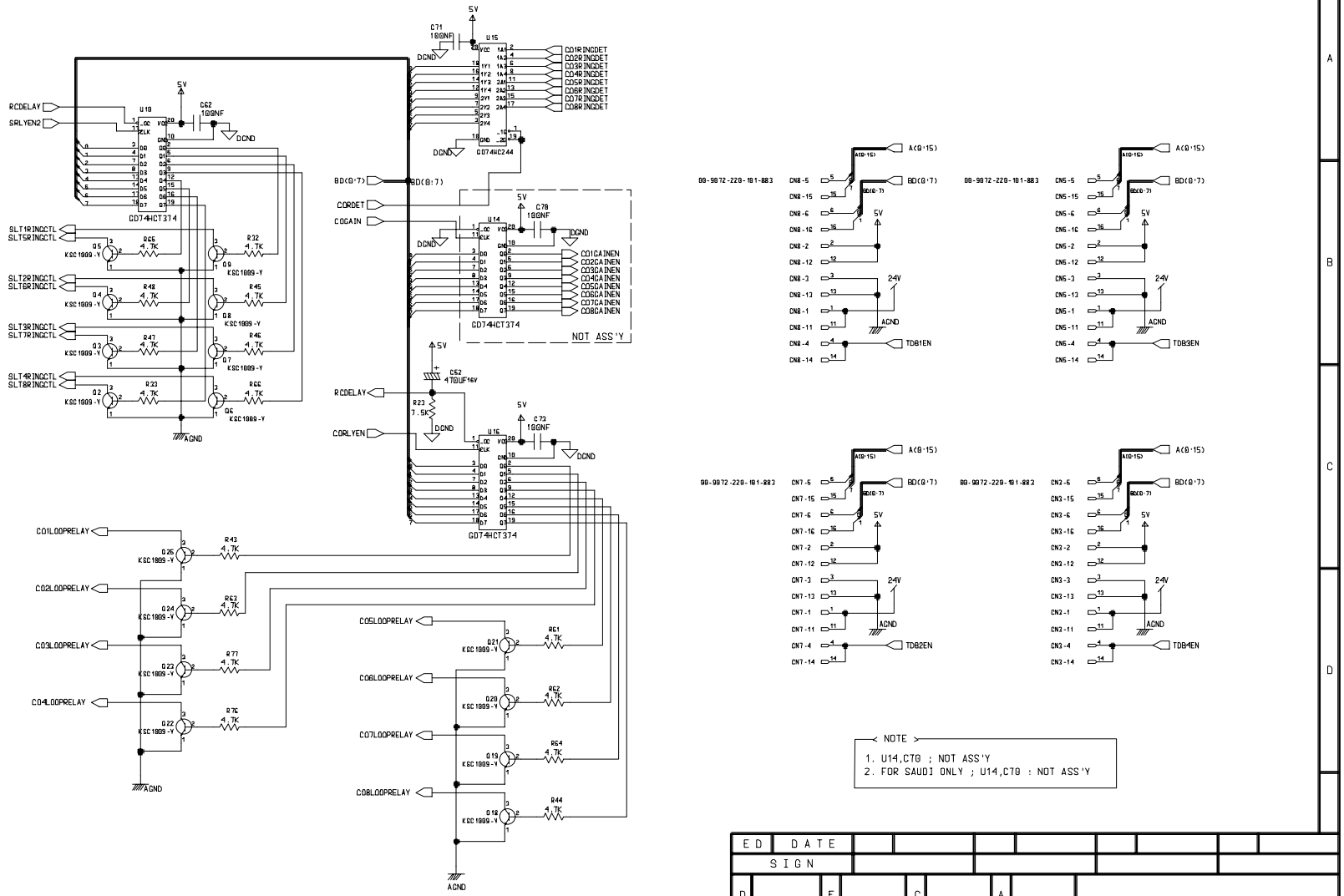
1. C64,C87,C68,C91,C98,C105,C88 ; NOT ASS'Y
2. C163 ; NOT ASS'Y
3. FOR SAUDI ONLY : C300-303 ; 470 PF
   R112,R109,R119,R126 ; 47K
   R39,R55,R41,R59,R90,R89,R68 ; 7.5K
   R38,R56,R60,R58,R74,R88,R70 ; 39K

ED	DATE							
SIGN								
DWG		ENG		CHK		APP	NX-1232 BASE (NWK PART)	
REF NO	GA92-01143A	SEC	GADB-000055	7/9				



Samsung Electronics Co., Ltd.
All Rights reserved.

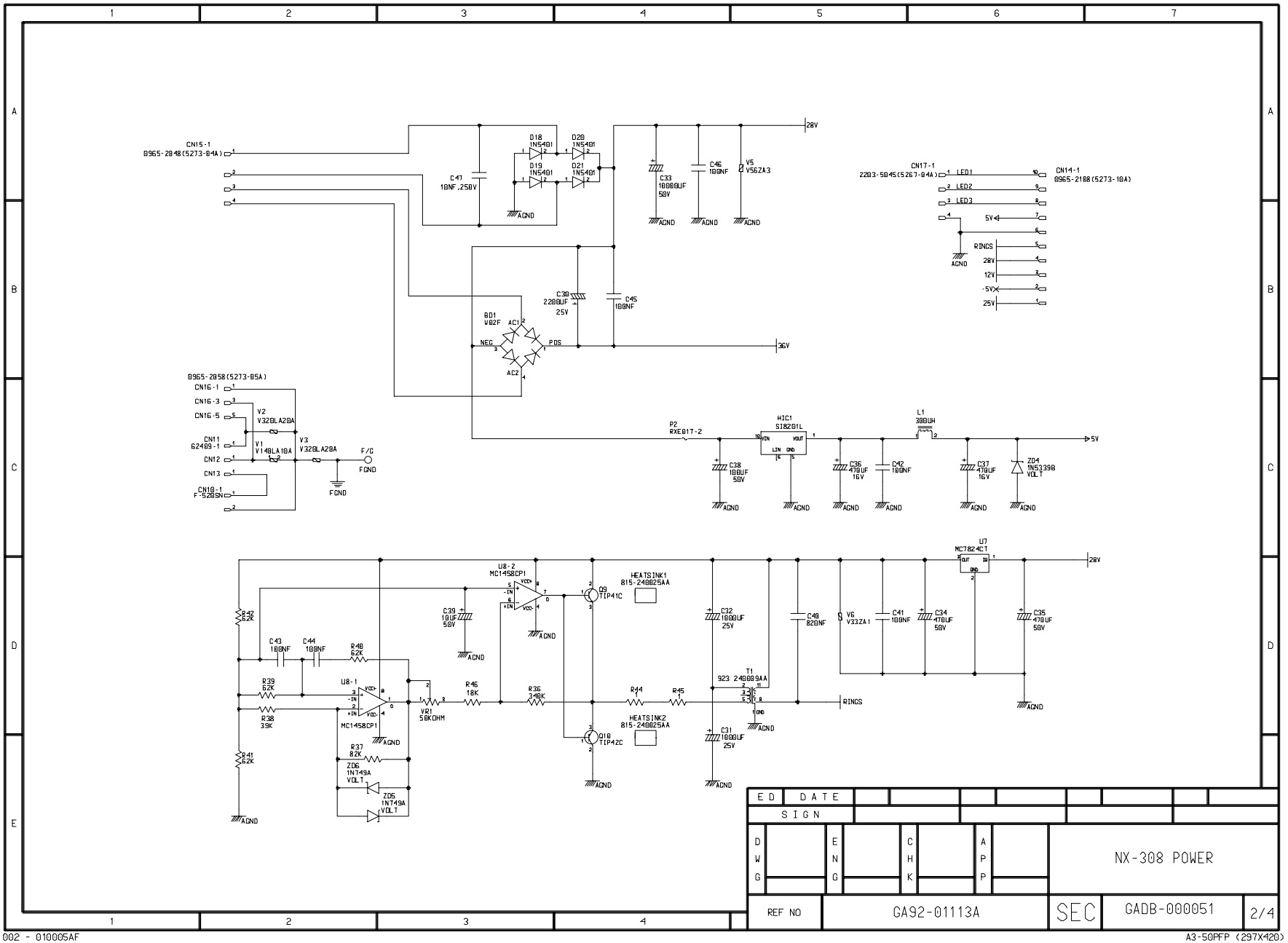
Samsung Electronics Co., Ltd.
All Rights reserved.



ED	DATE									
SIGN										

DWG		ENG		CHK		APP		NX-1232 BASE (CO PART)		
REF NO	GA92-01143A							SEC	GADB-000055	9/9

Samsung Electronics Co., Ltd.
All Rights reserved.



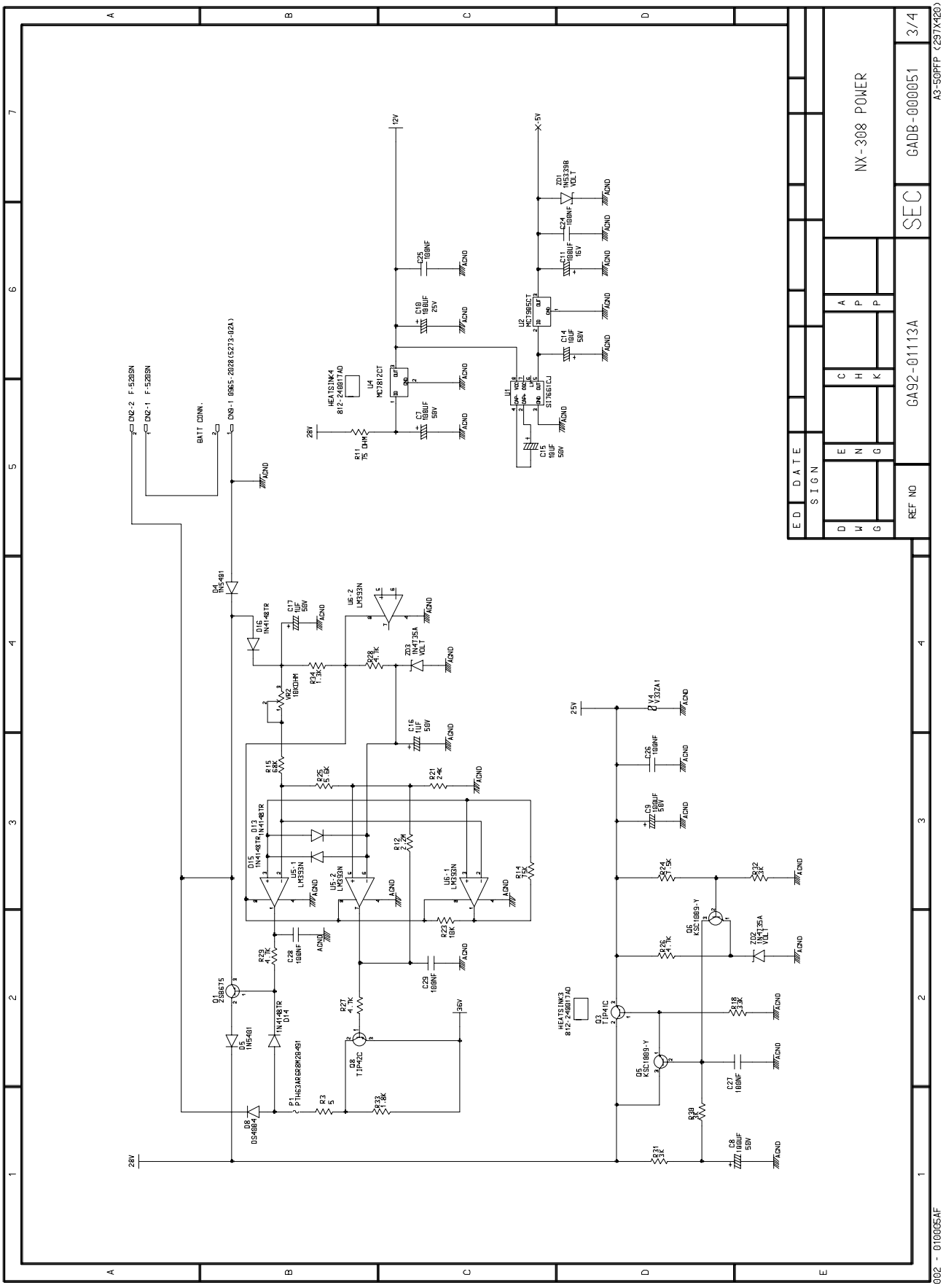
ED	DATE							
	SIGN							

DWG		ENG		CHK		APP		NX-308 POWER

REF NO	GA92-01113A	SEC	GADB-000051	2/4

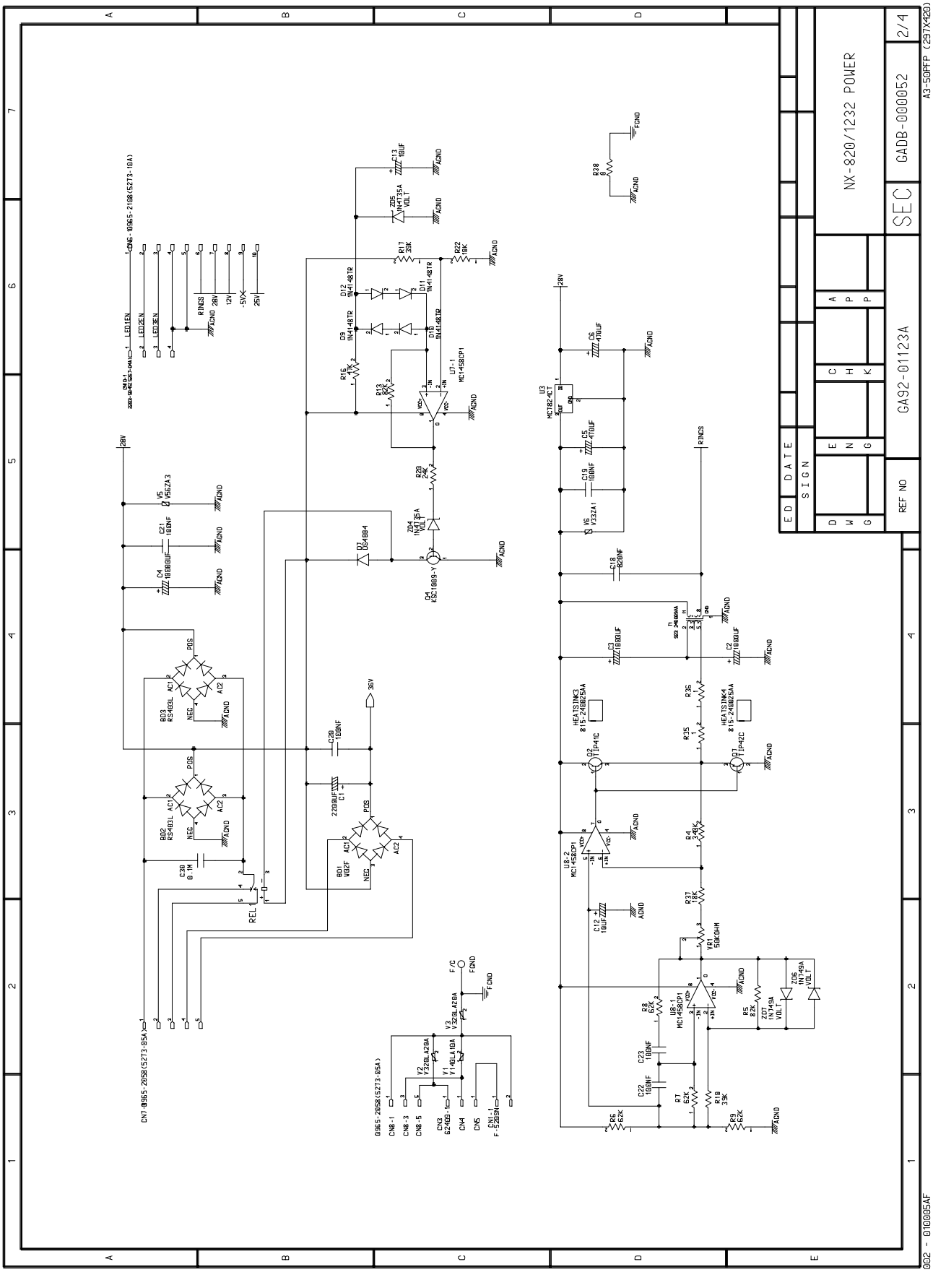
002 - 010005AF

A3-50PFP (297X420)

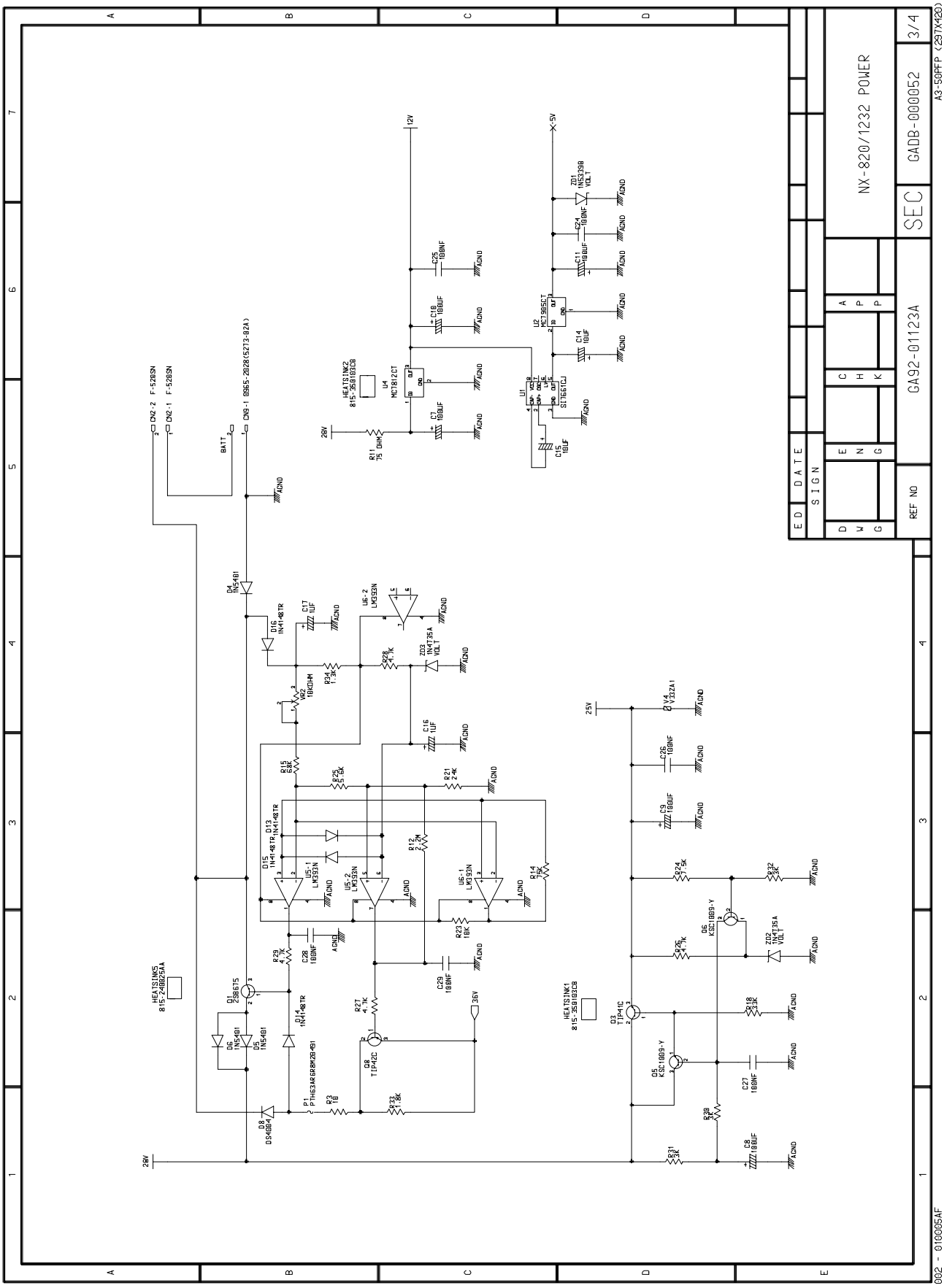


Samsung Electronics Co., Ltd.
All Rights reserved.

AC POWER CABLE
(230V/115V)
ALPS(SDJ3S-A)
DN-OFF SWITCH
250V/1A S.B
(BROWN)
WHITE
(BLUE)
BLOCK
(GREEN/YELLOW)
GREEN
F/G
FGND
CN1
CN3
CN13
CN18-1
CN18-2
CN2-1
CN2-2
250V/2A S.B
(FOR AC POWER)
250V/3A S.B
(FOR BATTERY POWER)
PCB ASS'Y
CN15-1
CN15-2
CN15-3
CN15-4
CN7-5
18V AC
5V AC
MAIN
TRANSFORMER
(NX-308)
230V AC
115V AC
CN16-5
CN16-3
CN16-1
CN11
CN12
NX-308 POWER
GA92-01113A
GADB-000051
SEC
4/4
A3-50FFP (297X420)
002 - 010005AF

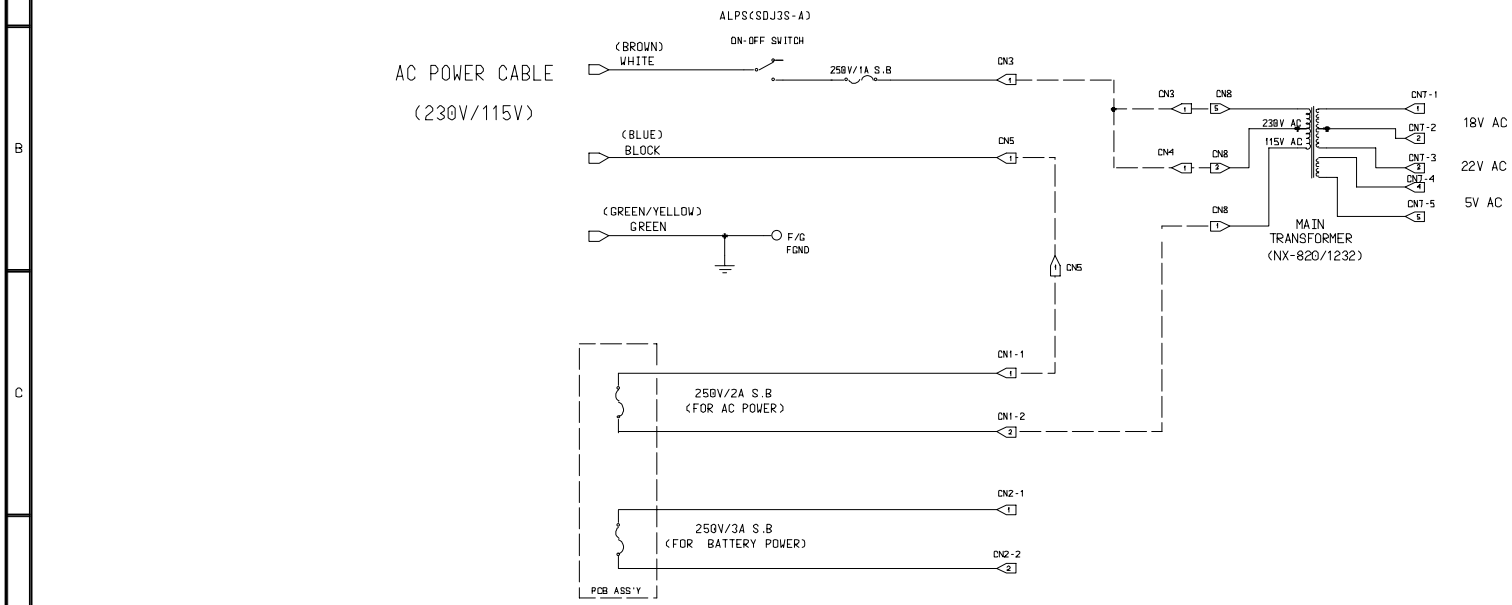


Samsung Electronics Co., Ltd.
All Rights reserved.

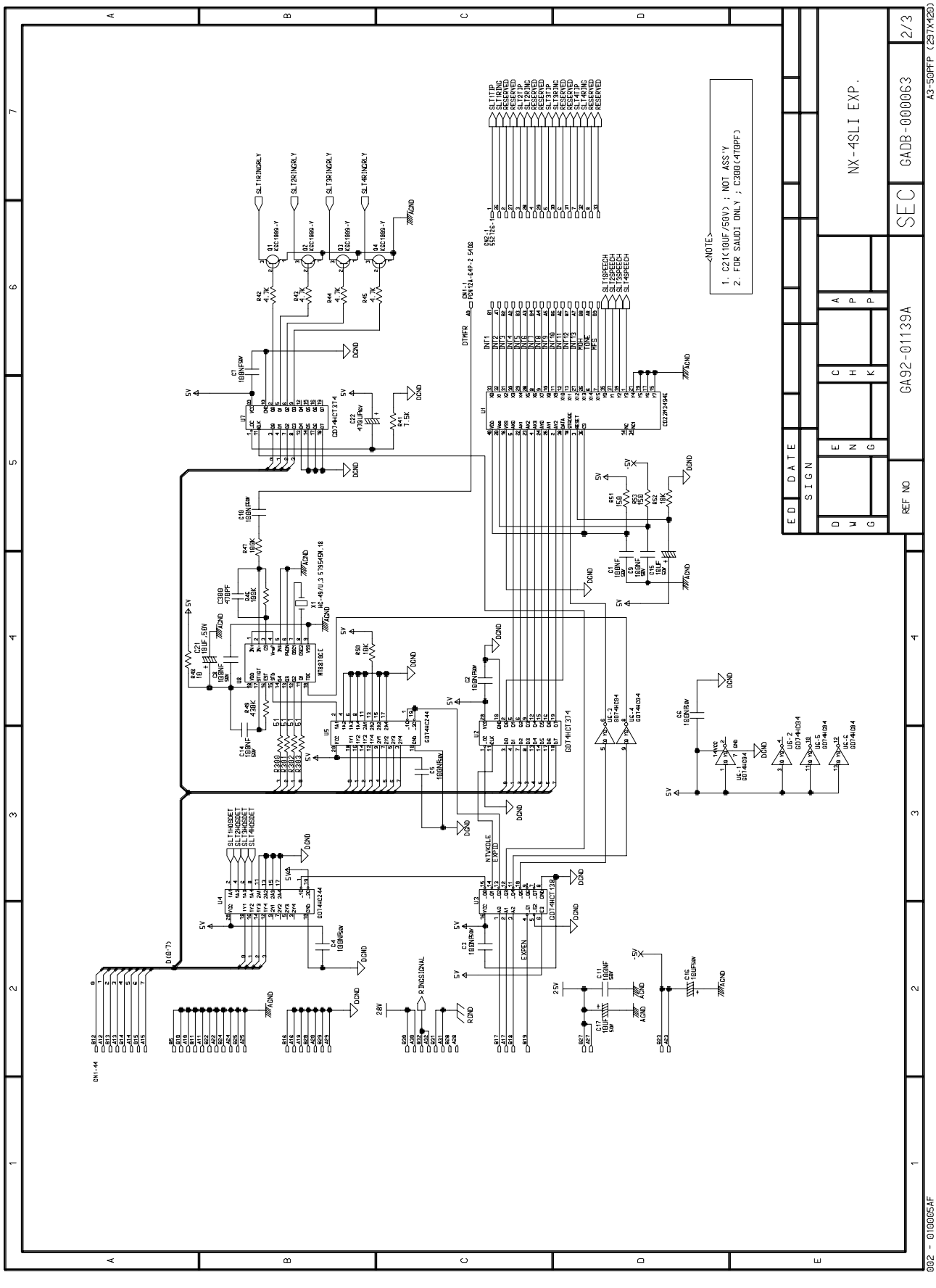


Samsung Electronics Co., Ltd.
All Rights reserved.

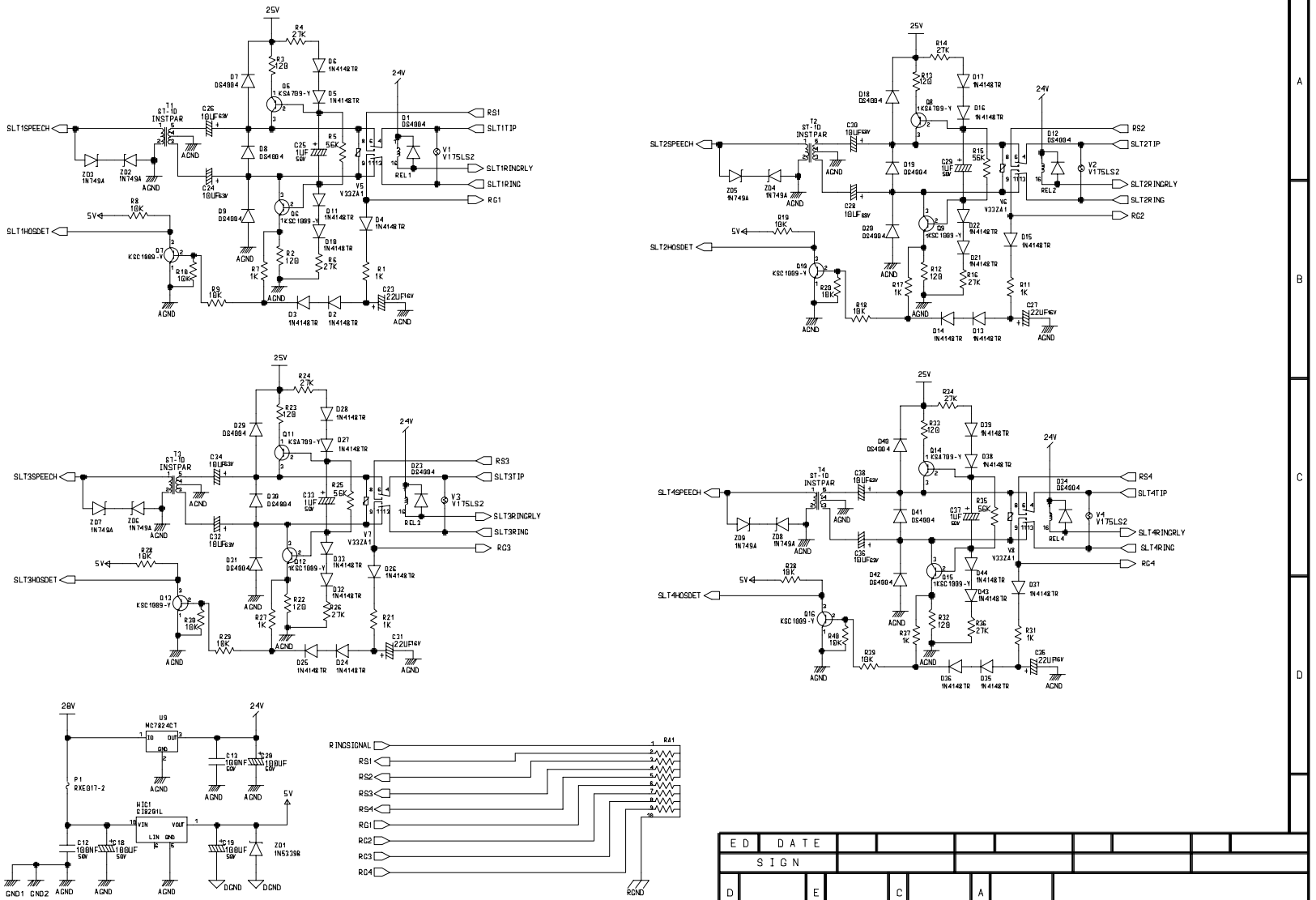
Samsung Electronics Co., Ltd.
All Rights reserved.



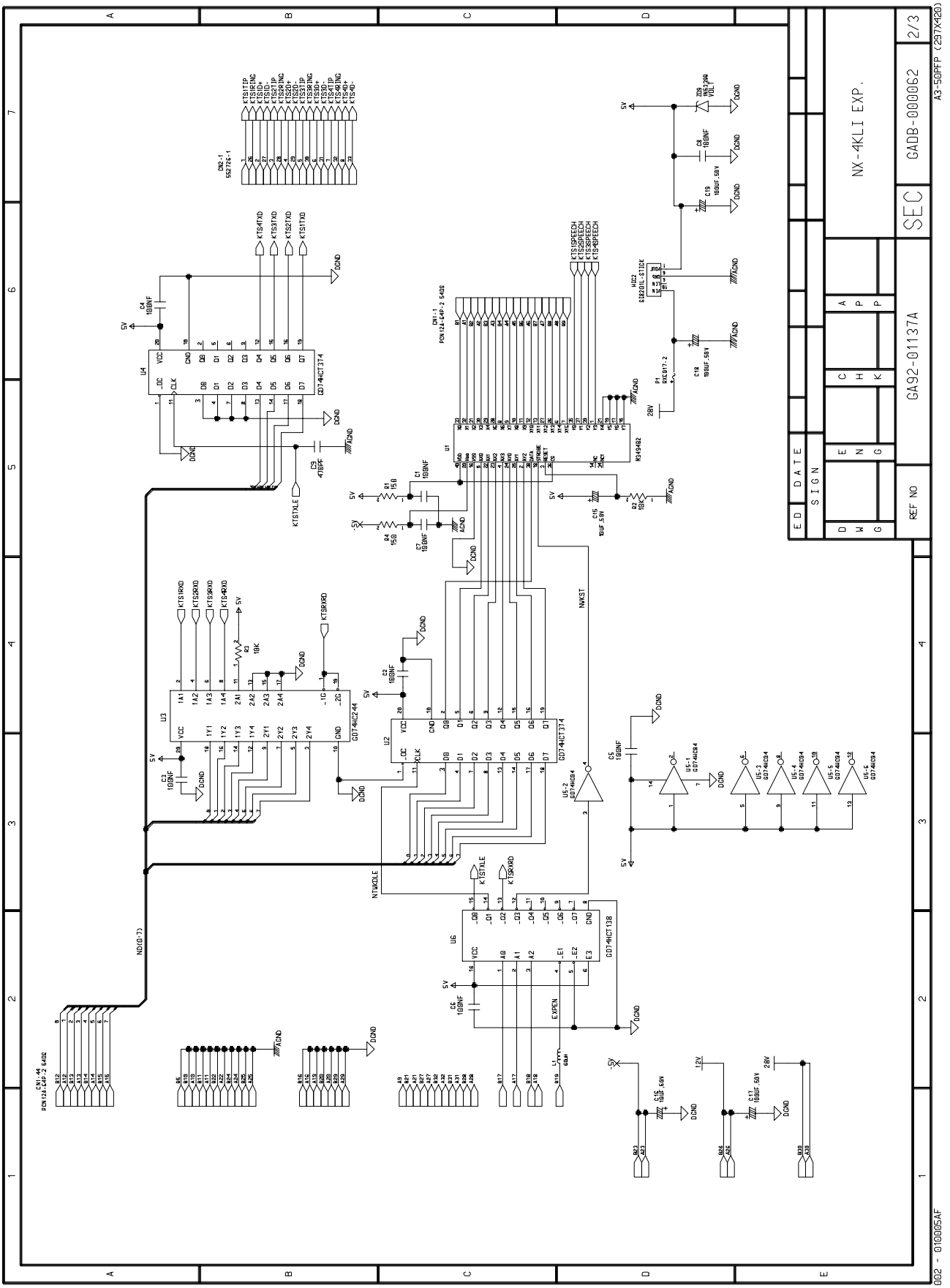
ED	DATE	02	98.01.14										
SIGN													
DWG		ENG		CHK		APP		NX-820/1232 POWER					
REF NO	GA92-01123A							SEC	GADB-000052				4/4


NX-4SLI EXP.
SEC
GADB-000663
2/3
GA92-01139A
REF NO
A3-50PFP (297X420)
002 - 010005AF

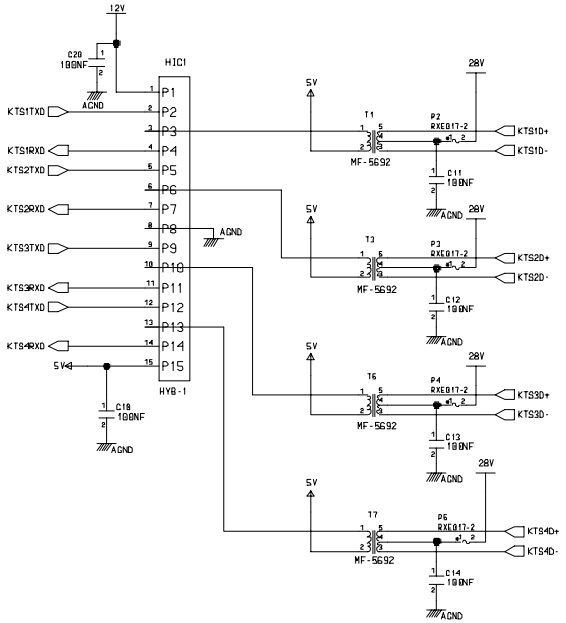
Samsung Electronics Co., Ltd.
All Rights reserved.

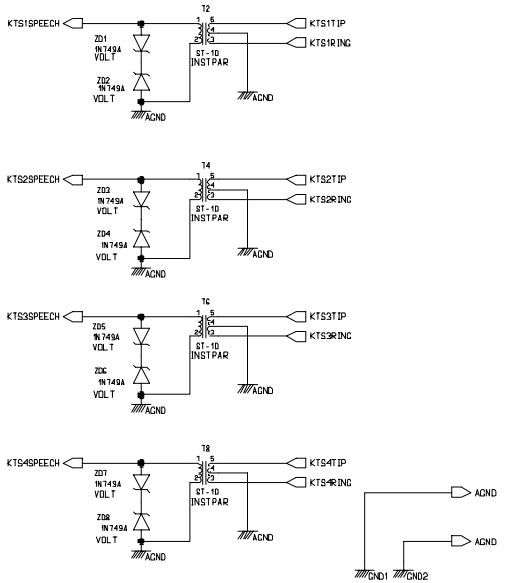


002 - 010005AF

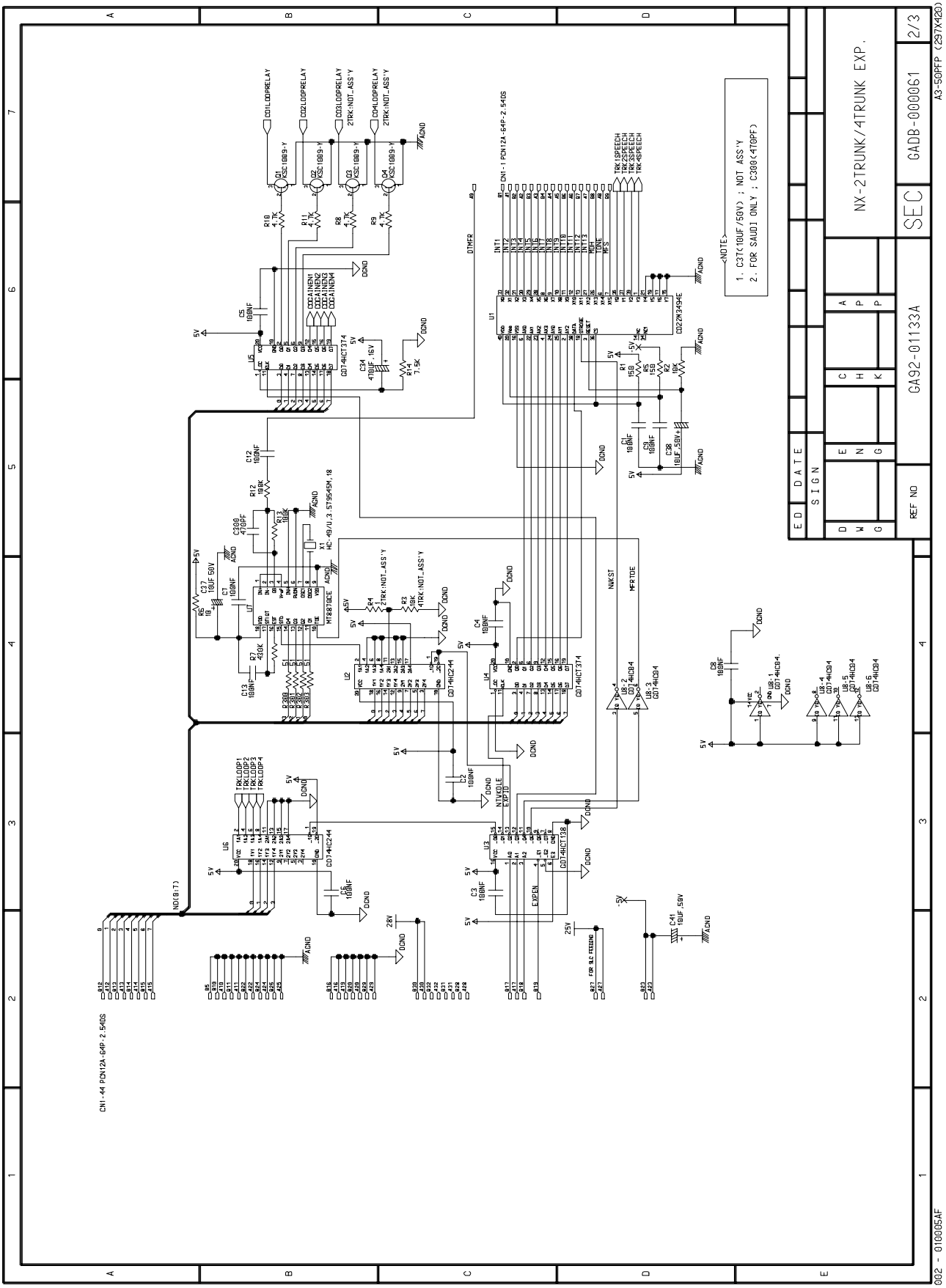

NX-4KLI EXP.
GADB-000062
2/3
GA92-01137A
SEC
REF NO
A3-50FFP (297X420)
002 - 010005AF

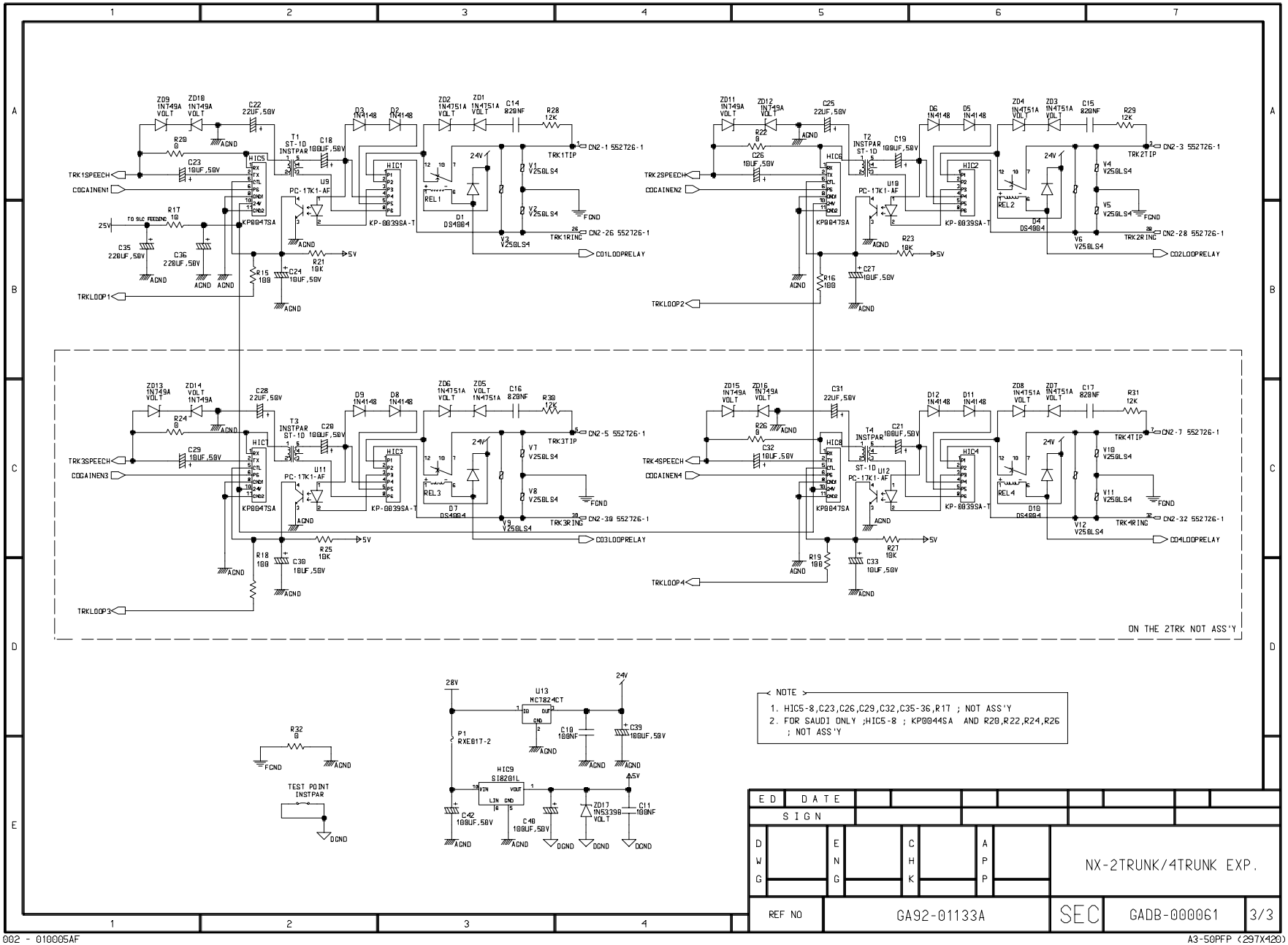
Samsung Electronics Co., Ltd.
All Rights reserved.



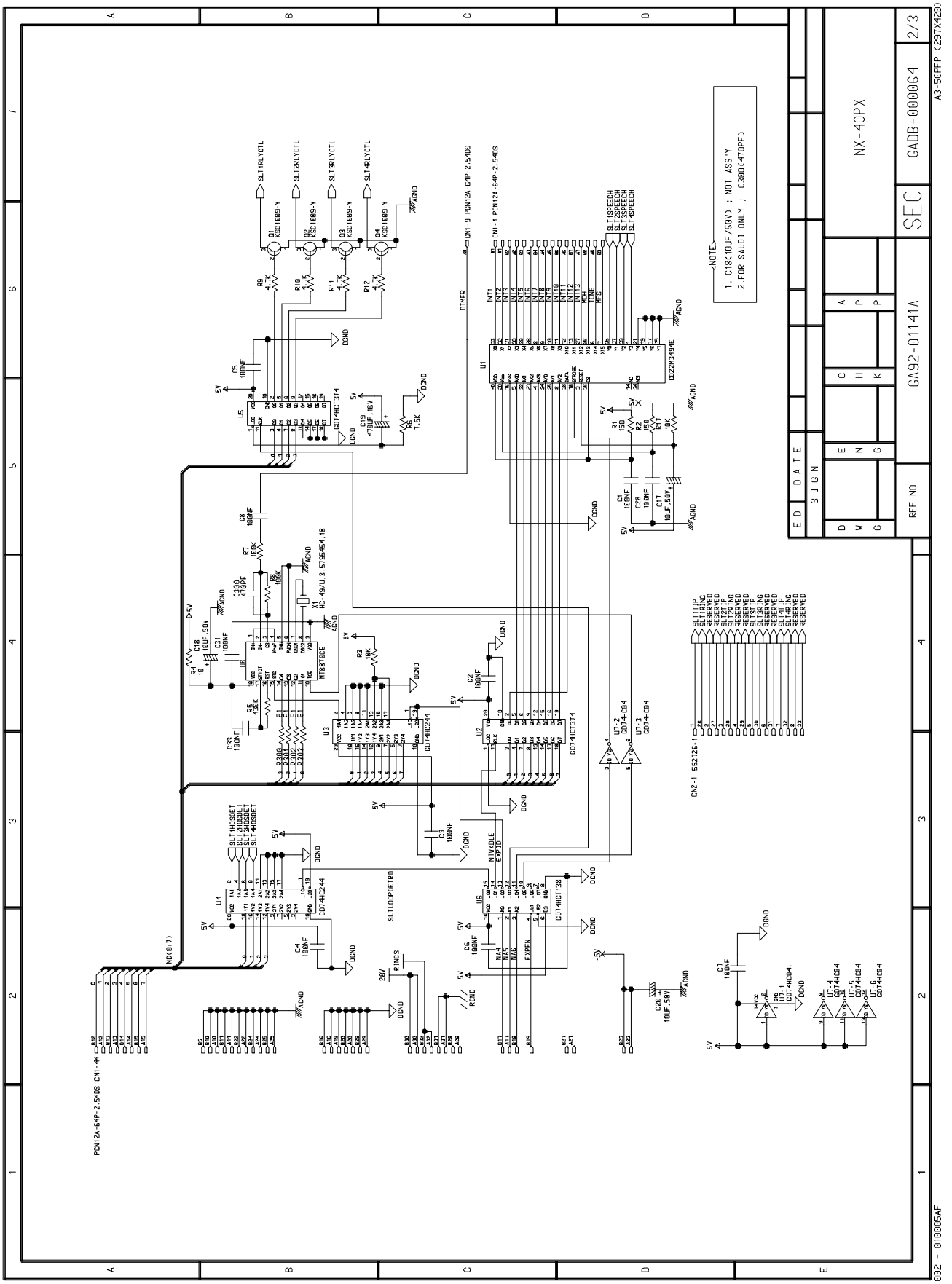


ED	DATE								
SIGN									
DWG		ENG		CHK		APP		NX-4KLI EXP.	
REF NO	GA92-01137A					SEC	GADB-000062		3/3

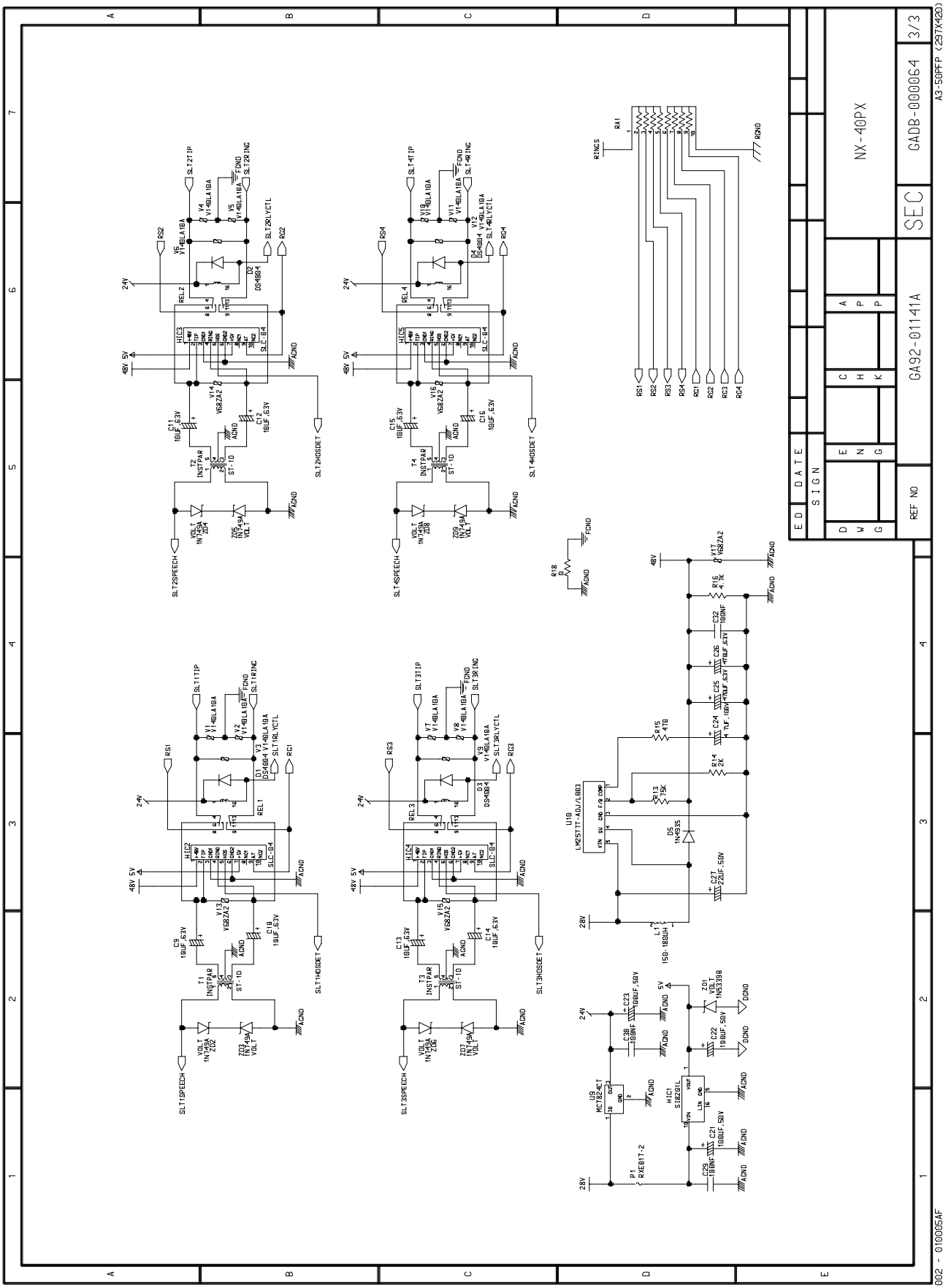

NX-2TRUNK/4TRUNK EXP.
SEC
GADB-0000061
2/3
CA92-01133A
REF NO
A3-50FFP (297X420)
002 - 010005AF
<NOTE>
1. C37(10UF/50V) ; NOT ASS'Y
2. FOR SAUDI ONLY ; C300(470PF)



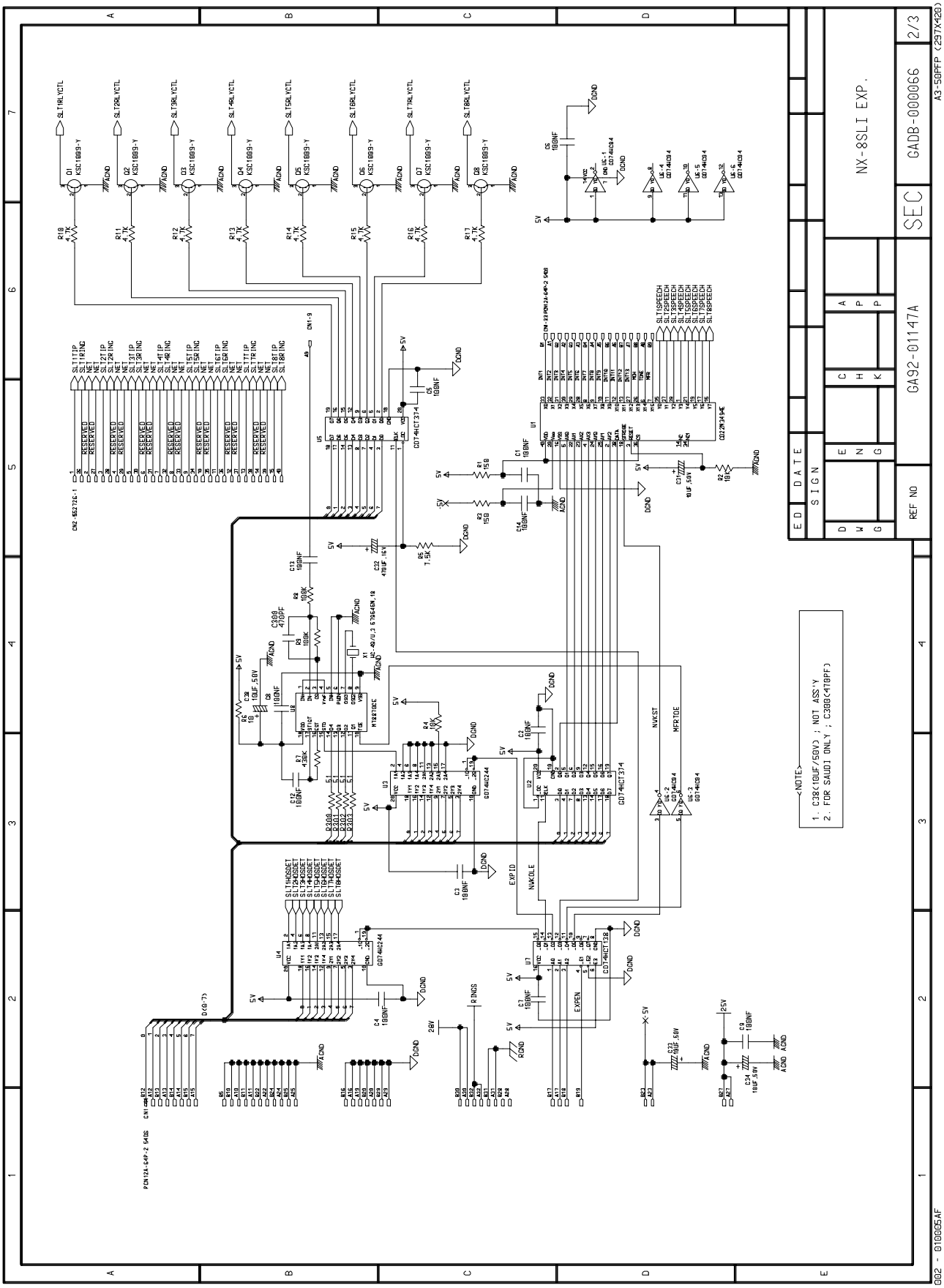
Samsung Electronics Co., Ltd.
All Rights reserved.



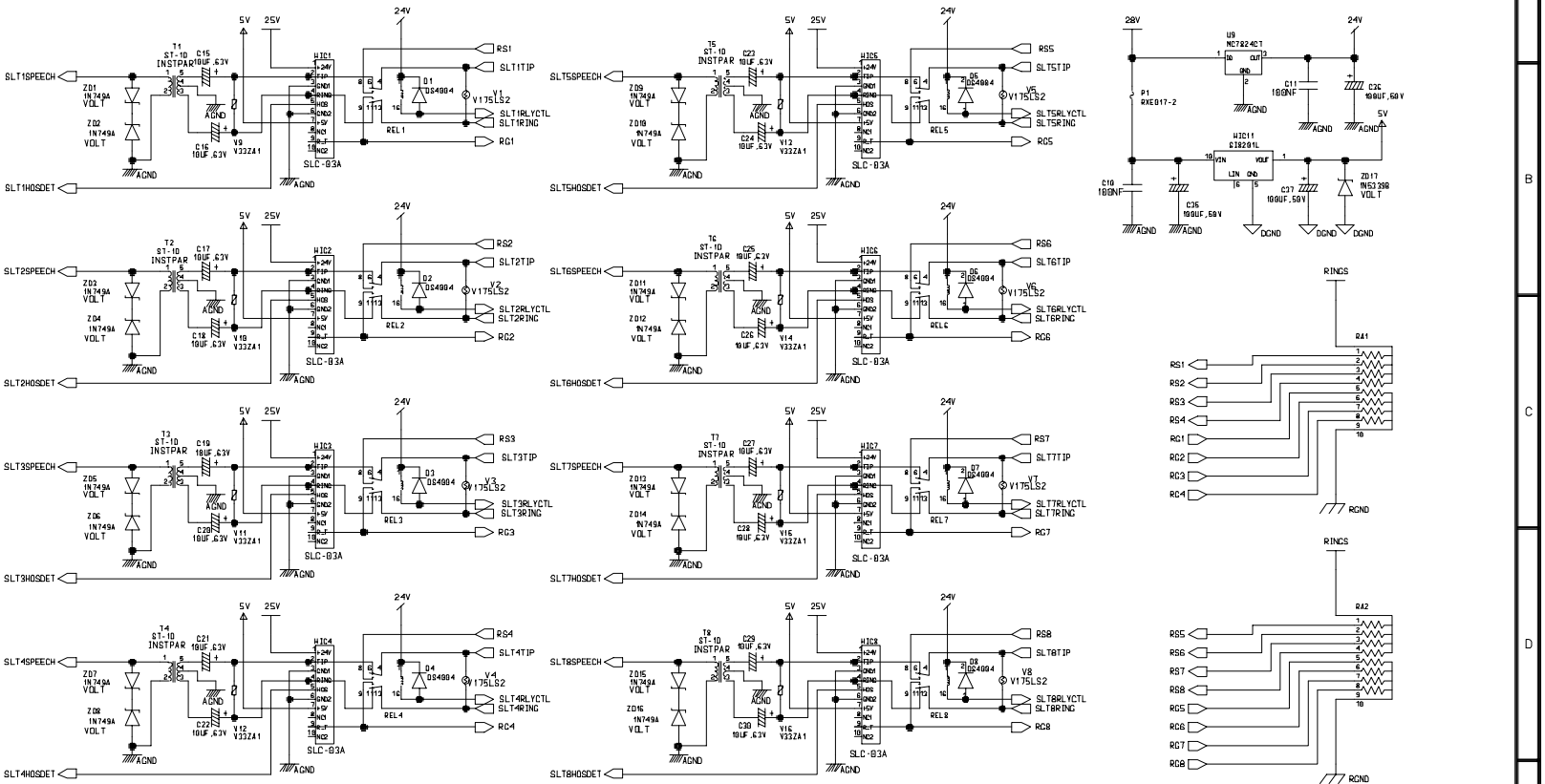
Samsung Electronics Co., Ltd.
All Rights reserved.



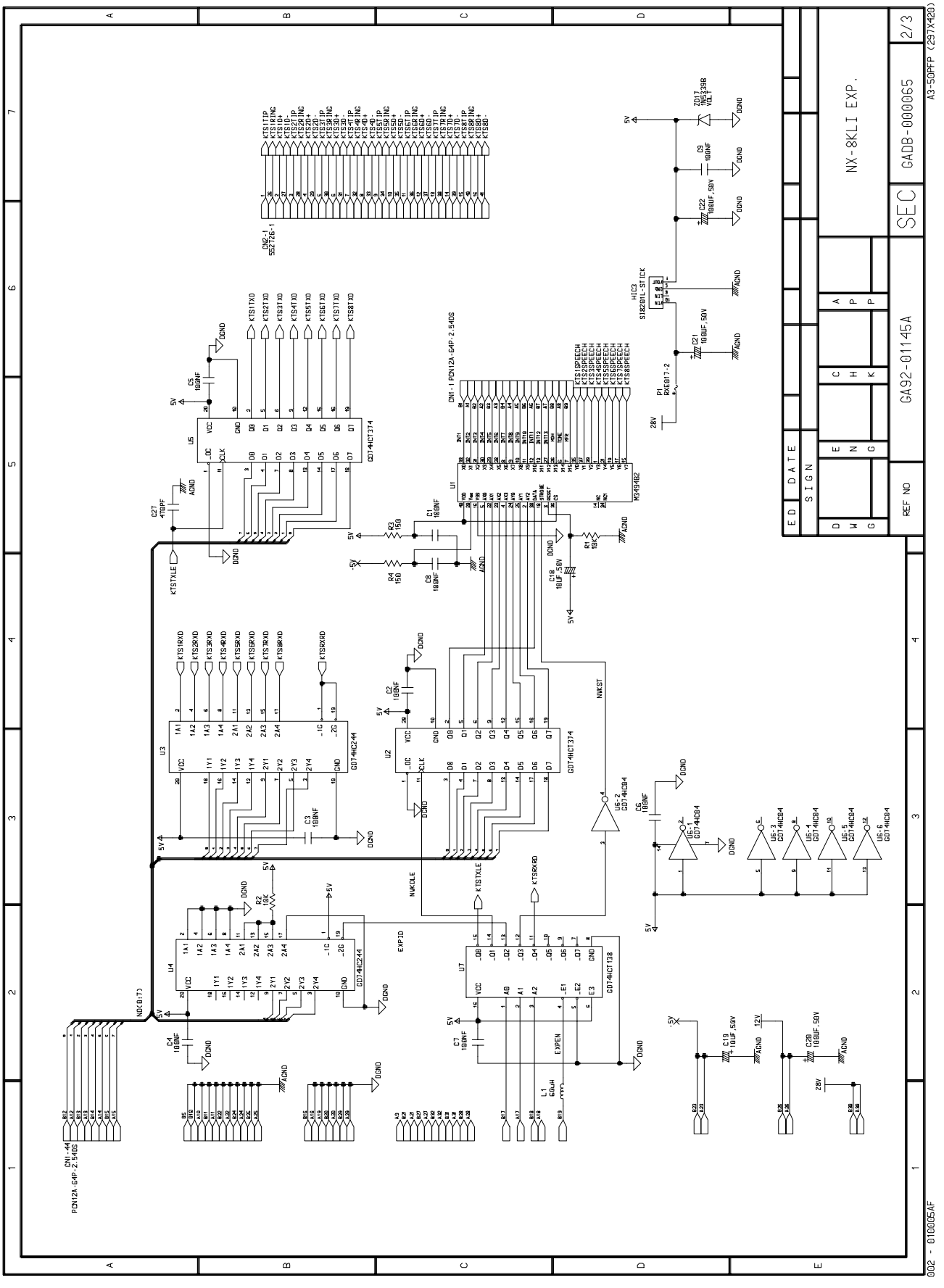
Samsung Electronics Co., Ltd.
All Rights reserved.


NX-8SLI EXP.
GA92-01147A
GADB-000066
SEC
2/3
A3-50FFP (297X420)
REF NO
DRAWING
CHECKED
APPROVED
DATE
SIGN
EDIT
<NOTE>
1. C38(10UF/50V) ; NOT ASSY
2. FOR SAUDI ONLY ; C300(470PF)
002 - 010005AF

Samsung Electronics Co., Ltd.
All Rights reserved.

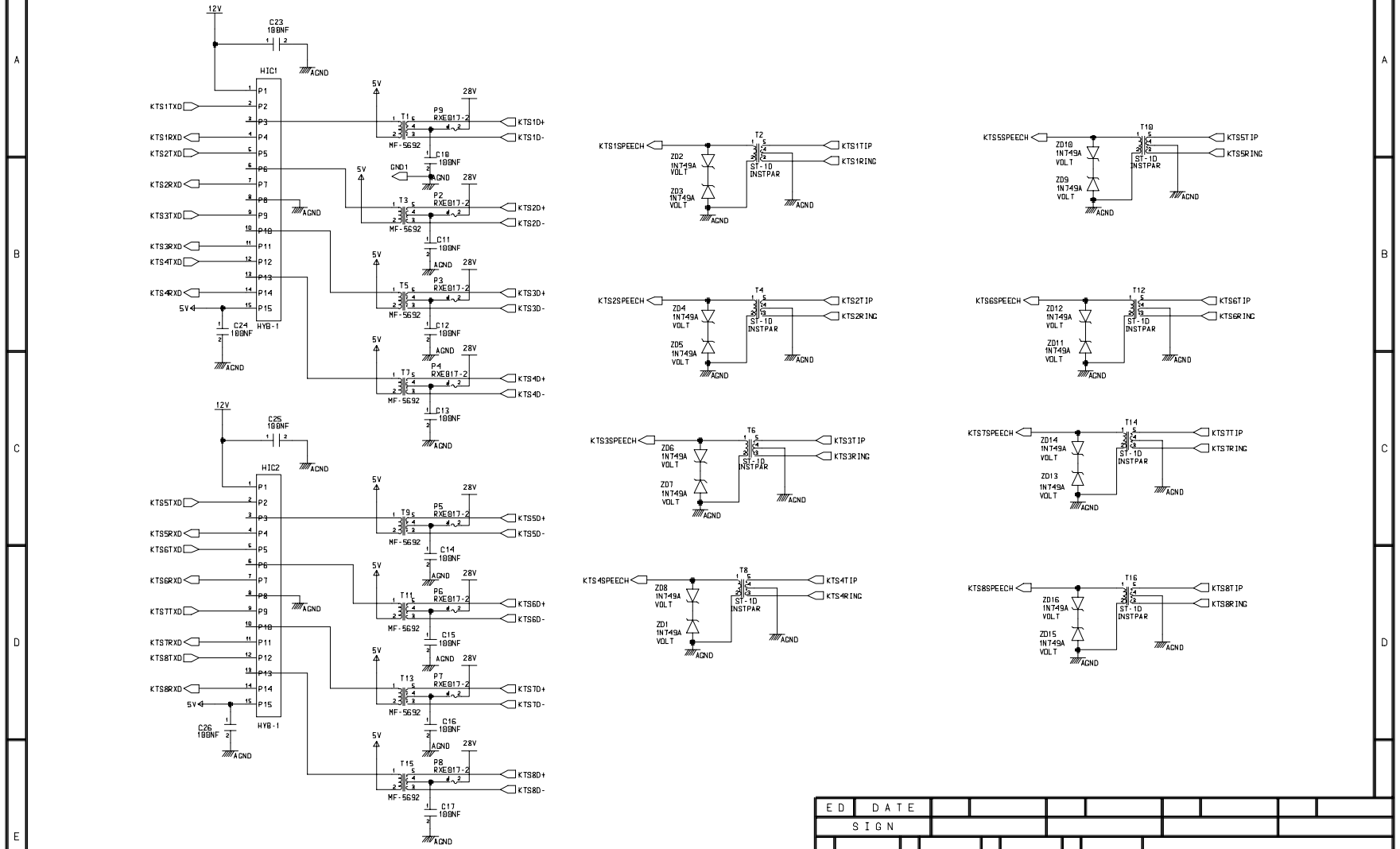


ED	DATE														
	SIGN														
DWG		ENG		CHK		APP		NX-8SLI EXP.							
REF NO		GA92-01147A						SEC		GADB-000066				3/3	



Samsung Electronics Co., Ltd.
All Rights reserved.

Samsung Electronics Co., Ltd.
All Rights reserved.



ED	DATE							
	SIGN							

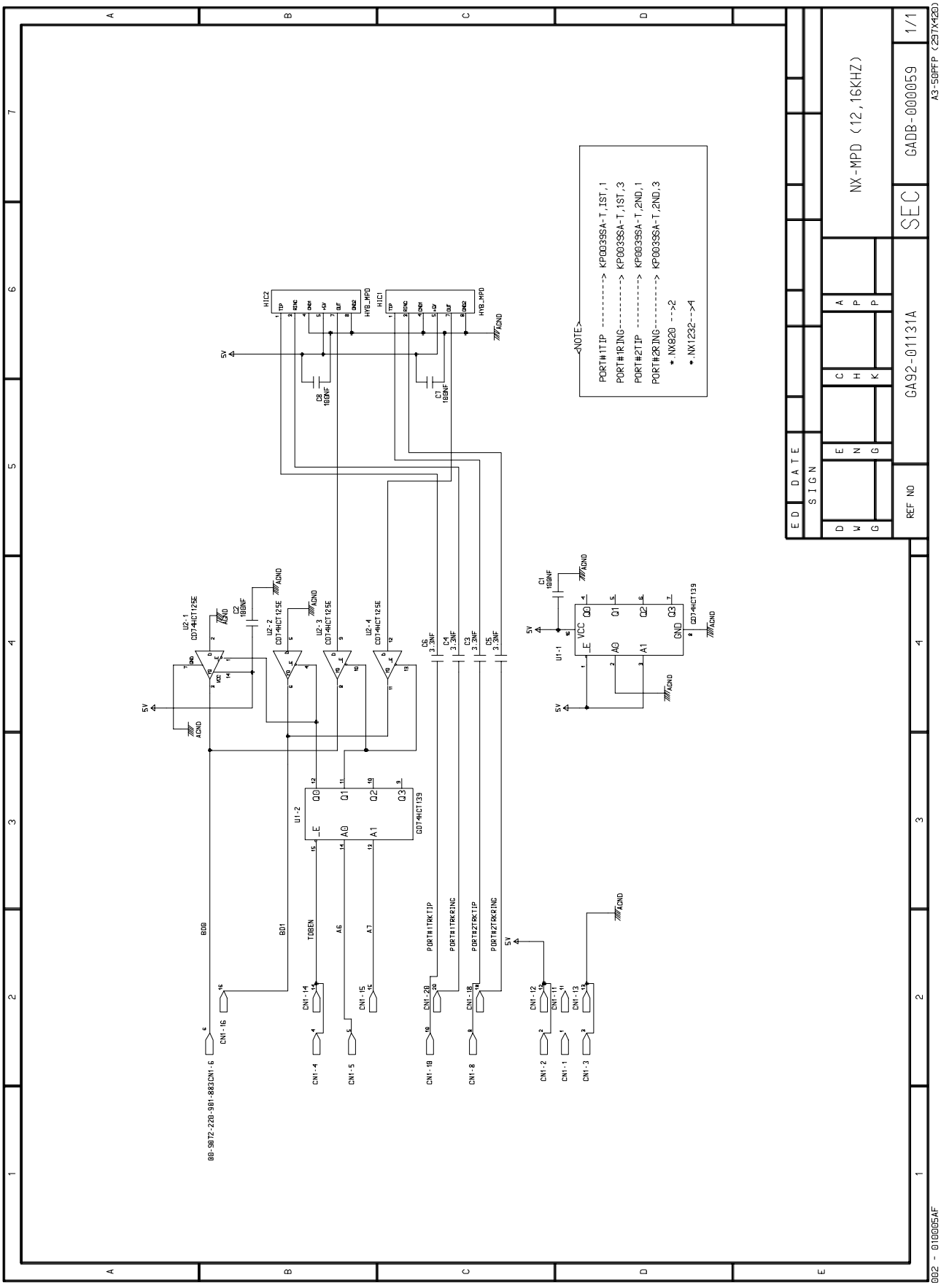
DWG		ENG		CHK		APP		NX-8KLI EXP.

REF NO	GA92-01145A	SEC		3/3

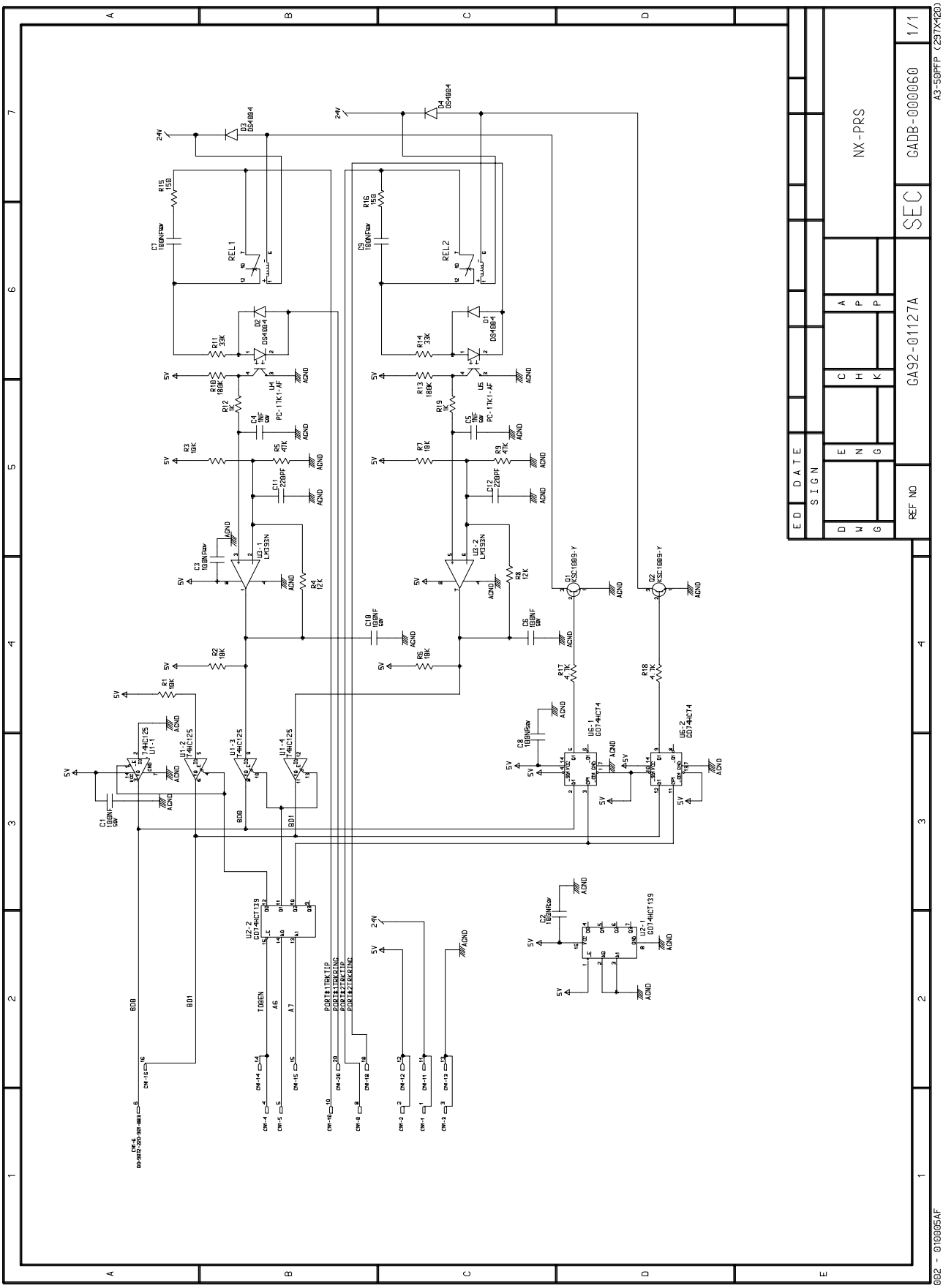
002 - 010005AF

A3-50PFP (297X420)

Samsung Electronics Co., Ltd.
All Rights reserved.

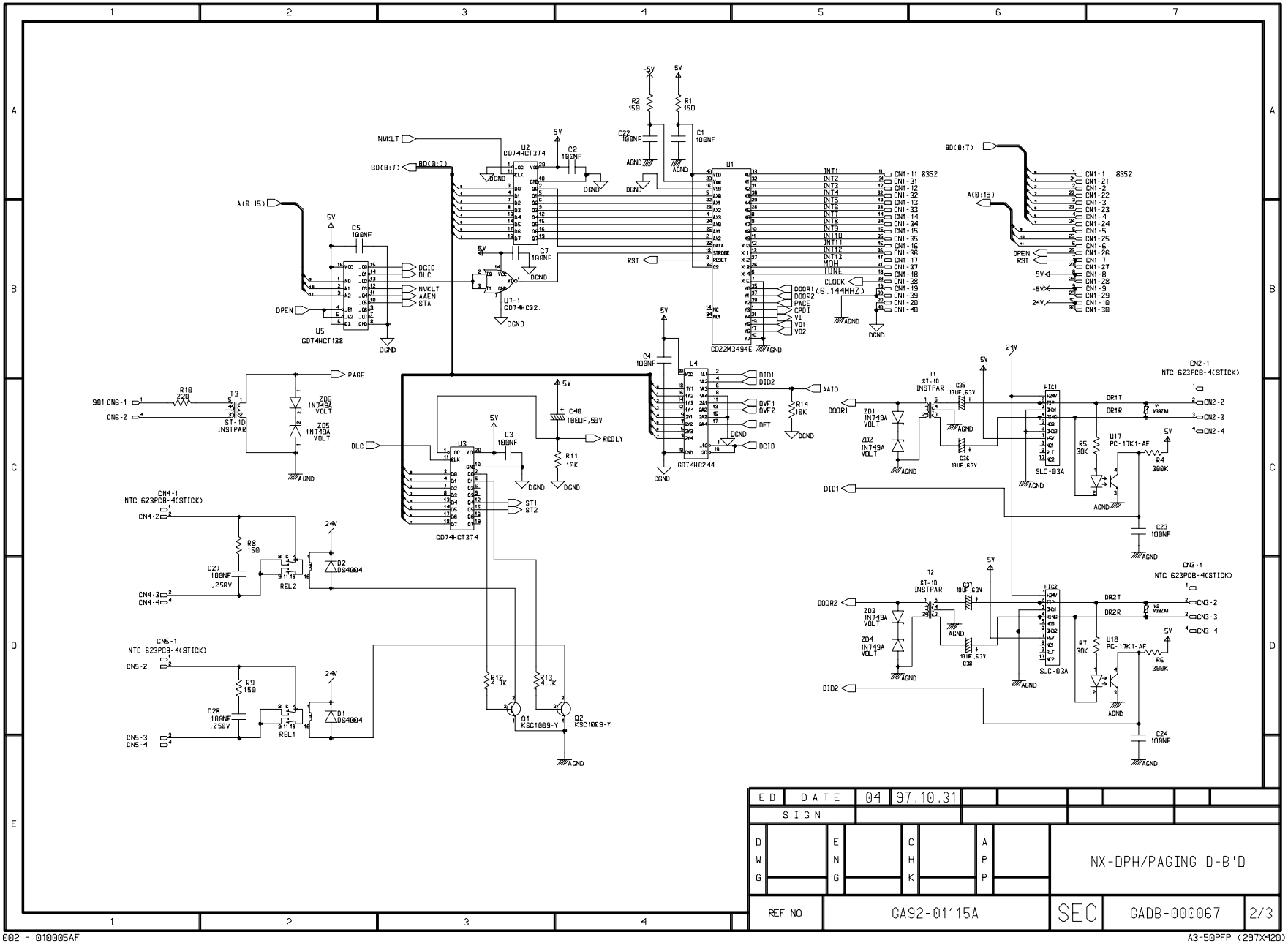


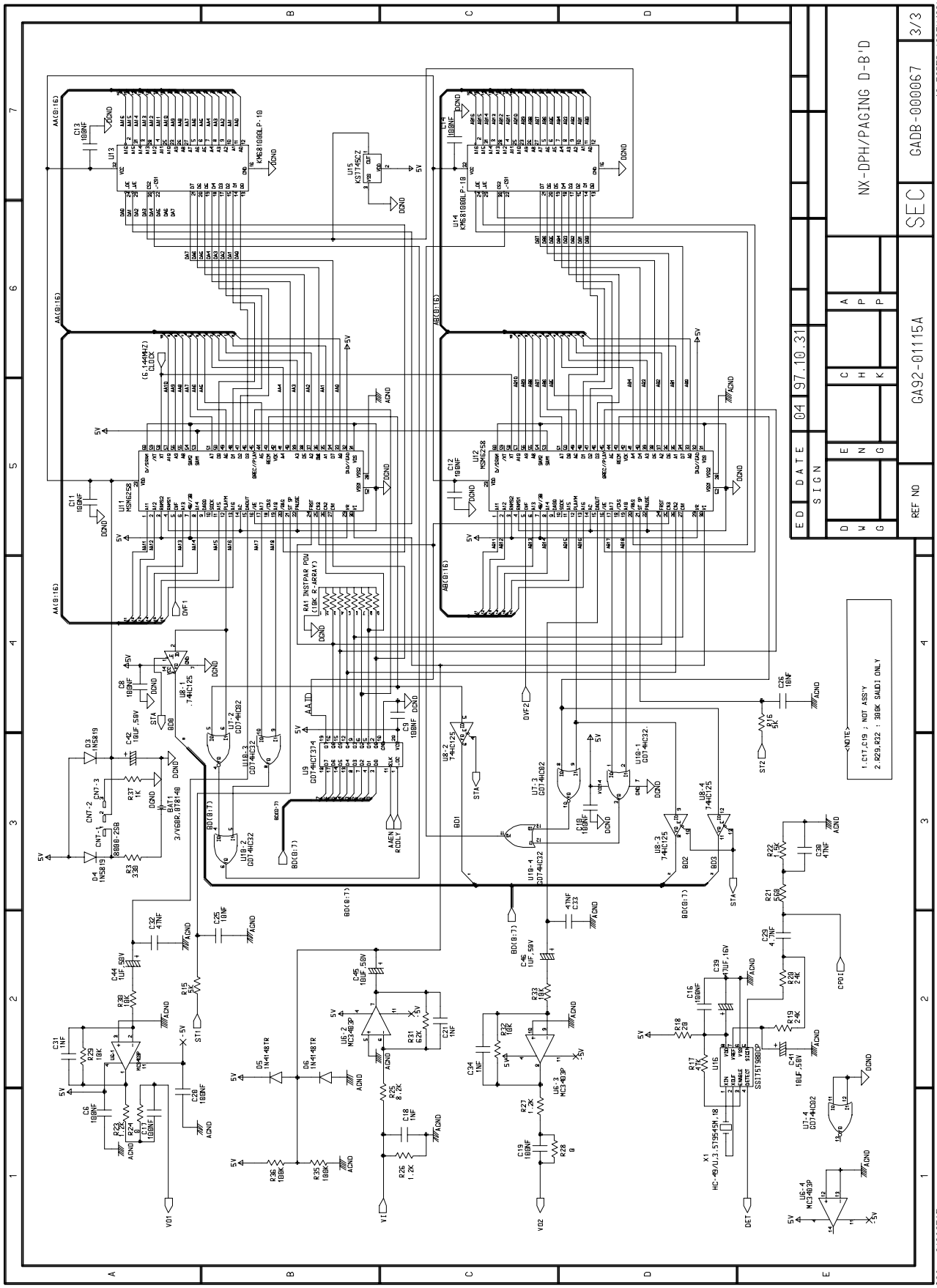
Samsung Electronics Co., Ltd.
All Rights reserved.



Samsung Electronics Co., Ltd.
All Rights reserved.

Samsung Electronics Co., Ltd.
All Rights reserved.





Samsung Electronics Co., Ltd.
All Rights reserved.